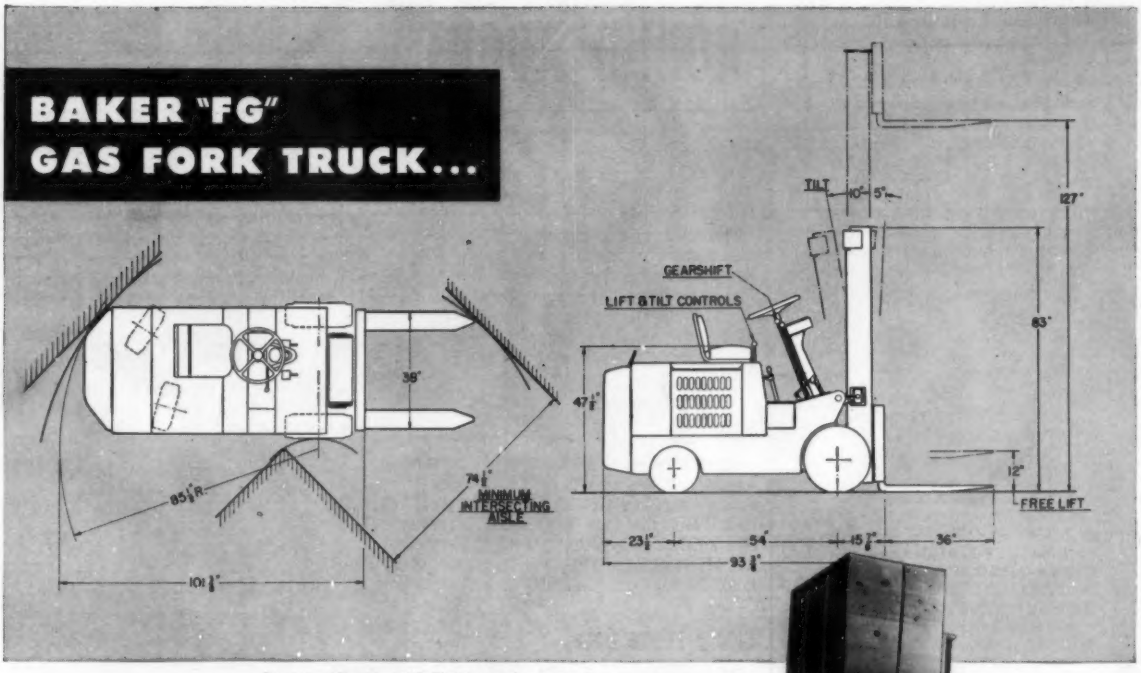
BAKER "FG" GAS FORK TRUCK...



Dimensional Drawing of FG-60, 6000 pound capacity.

why "BALANCED DESIGN" makes it the best!

"Balanced Design" means that every component be engineered to its specific function. Further that all elements be matched and coordinated to work together for top efficiency, maximum dependable service and longest life.

In the "Balanced Design" Baker FG Gas Trucks, for example, you get an integrated power train, consisting of drive axle, transmission and clutch, selected and engineered to be the best possible unit to perform its required function. Features include: compact rigid construction without troublesome universal joints, split clutch housing for easy accessibility, and *single oil supply for entire assembly.*

"Balanced Design" also assures you that the power plant is not merely an automotive engine modified for truck use. It is a heavy-duty industrial engine specially engineered for rugged industrial truck service and built by an outstanding manufacturer. Our specifications call for moving parts to balance much closer than ordinary engine parts: pistons balanced to ± grams instead of ounces, crankshaft to 4 inch-ounces and connecting rods to 2 grams.

These are some of the reasons why Baker "FG" is the only gas fork truck with a full 6 months' warranty, and why we say "BALANCED DESIGN" makes it the best.

Baker "FG" gas fork trucks are available with 3,000, 4,000, 5,000 and 6,000 pound capacities. Specific bulletins can be obtained by writing The Baker-Raulang Co., 1251 West 80th Street, Cleveland 2, Ohio.

8 REASONS WHY THE BAKER FG FORK TRUCK IS FIRST IN ITS CLASS...

1. **LOWER INITIAL COST**—FG-40 (4000 lb.) $4295. Other models at proportionate savings.
2. **LONGER WARRANTY PERIOD**—Baker quality permits full 6 months warranty.
3. **HIGHER LIFT**—Mast design allows higher standard lift than ordinary trucks.
4. **LOWER MAINTENANCE COSTS**—Designed for easier and less frequent servicing.
5. **MORE MANEUVERABLE**—Short turning radius cuts aisle width, adds floor space.
6. **EASIER TO OPERATE**—Greater visibility ... easy-to-work controls.
7. **GREATER STABILITY**—Lower center of gravity, higher "stability factor" ratio.
8. **BETTER BRAKING**—Full floating, self-equalizing, self-energizing brakes.

Baker
HANDLING EQUIPMENT

505

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Farr Co. Promotes Engineer

APPOINTMENT of **Cletus J. Oster** to the position of plant superintendent of the Farr Co., Los Angeles, California manufacturer of air filters and related equipment, was recently announced.

Since joining the company eight years ago, Oster has served in the capacity of project engineer and assistant chief engineer. His previous experience includes the position of assistant plant engineer of the Midland Steel Products Corp., Cleveland, Ohio.

Circle These Dates

DATES WHICH you will surely want to mark on your calendar are January 23, 24 and 25. This is when the Seventh Annual Plant Maintenance and Engineering Conference will take place.

It will be held in Philadelphia this coming year at Convention Hall. We thought you would like to have this early reminder so that you can make necessary arrangements to attend this conference. A more detailed description of the subjects and speakers for the three-day conference will be published at a later date.

Report on Hydraulic Conference

DISCUSSIONS OF standardization of hydraulic components, a new type of fire-resistant fluid and how to design and build for leakproof connections in hydraulically actuated equipment highlighted the Fabricating Machinery Hydraulic Conference. It was recently held in the Hotel Statler in Detroit under the sponsorship of Vickers Incorporated.

Features of the first day's sessions were a reference to the need for standardization of hydraulic components and a discussion of hydraulic fluids which included mention of new fire-resistant fluids.

It was brought out in the discussion of hydraulic fluids that although experimental results are still inconclusive, present indications are that the new water soluble fire-resistant fluids (oil-in-water

(Continued on page 4)

Plant Engineering Receives Public Interest Award Plaque for 1954

General George C. Stewart (center), General Manager of the National Safety Council, presents 1954 Public Interest Award Plaque to Tom Hanson, Editor, Plant Engineering, while Richard H. Morris, Editorial Director, Plant Engineering, looks on. This is the fifth time the magazine has won this safety award

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of Address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

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Bifurcator Fans exhaust fumes at *top efficiency* by avoiding a directional change in the air stream. Other fans often require a 90° change in direction of the exhaust stream with resultant loss in efficiency.

The fan motor stays clean, cool and accessible. Fumes are by-passed (bifurcated) around the motor chamber which is completely isolated from the exhaust stream.

Bifurcator Fan installs just like a section of ductwork.

A Bifurcator Fan is easily installed . . . just like a flanged section of ductwork. It can be mounted horizontally, vertically or at an angle. Lightweight and extremely compact, a Bifurcator requires no platform or supports. Bifurcators are available in sizes from 1140 CFM (12" diameter fan with 1/20 HP motor) up to 45,000 CFM (48" diameter fan with 20 HP motor). Housings and fan wheels can be fabricated of non-corrosive metals, or can be protected with a variety of corrosion-resistant coatings.

Be ready with the facts about Bifurcators next time you have a fume removal problem. Fill in and mail the handy coupon below . . . TODAY!

"DESIGN DATA FOR EXHAUST SYSTEMS" This helpful bulletin contains details, simplified data and charts. Compiled by Allen D. Brandt, Senior Sanitary Engineer, U. S. Public Health Service. Mail coupon for your FREE copy and Bifurcator Bulletin.

Certified Ratings

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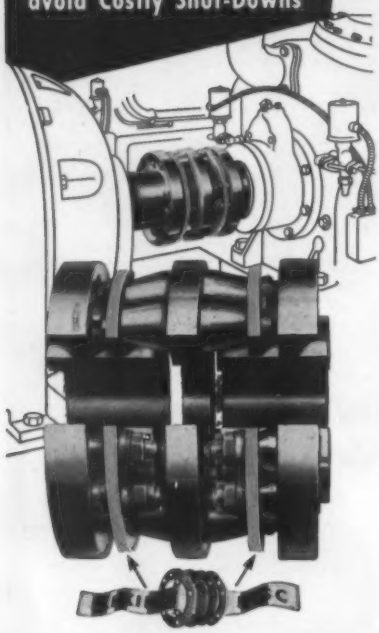
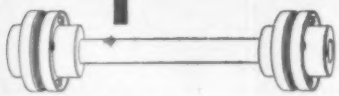
for Power Transmission to avoid Costly Shut-Downs

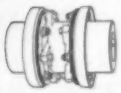


Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.





Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.

WARREN, PENNSYLVANIA, U.S.A.

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'ROUND ABOUT

and water-in-oil emulsions) will probably be limited in their application to working pressures below 300 psi to insure satisfactory performance.

During the discussion on how to design and build hydraulically actuated fabricating machinery for leakproof joints, it was brought out that one large press manufacturer successfully welds pipe to flanged connections to produce a no-leak joint. A pickling operation following welding removes the scale which may have formed on the pipe's ID during welding, and piping runs are thoroughly stress-relieved after welding. Silver soldered joints were also cited as a good means of controlling piping leaks. Induction heating was recommended as the ideal method for accomplishing the soldering operation with minimum distortion of the fitting.

125 Ways To . . .

IN A HANDY little 32-page booklet you will find 125 tips on how to improve your power shovel-crane operation.

Covering such fundamental points as starting and stopping the machine to care of the pitmen, cable hints, use of crawler mountings, working around high lines, shovel, crane and dragline operation and many other helpful points are included in this booklet.

It is available from the Power Crane and Shovel Association, 74 Trinity Place, New York 6, N. Y., at 15 cents per copy.

Calendar of Coming Events

SYMPOSIUM ON Electronics in Automatic Production will be held at the Sheraton-Palace, San Francisco, on August 22 and 23. This symposium is sponsored by Stanford Research Institute and the National Industrial Conference Board.

The 11th Annual National Electronics Conference will be held at the Hotel Sherman, Chicago, from October 3 to 5. Further information on this conference may be obtained from J. Kocik, Publicity Committee Chairman, National Electronics Conference, c/o Illinois Bell Telephone Co., 208 W. Washington St., Room 300, Chicago 6, Illinois.

Second Annual Lubrication Conference will be held at the Antlers Hotel, Indianapolis, Indiana, from October 10 to 12. Based on the number of papers received, the conference will be divided into the following sessions: 1. Bearing Instability; 2. Recent Studies in Hydrodynamic Lubrication; 3. Lubricants; 4. Rolling Contact Bearings; and 5. Boundary Lubrication.

New Appointment for Jay Case

Jay S. Case has been appointed vice president in charge of production of Clyde Tube Forgings of America, Inc., Portland, Oregon.

Mr. Case joined the company after eight and a half years with Tube Turns, Inc., of Louisville, Kentucky, a division of the National Cylinder Gas Co. of Chicago. He held the position of chief plant and production engineer for the Louisville firm.

During the past year, Jay Case has served as president of the Kentuckiana Plant Engineers' Society which is a chapter of the American Institute of Plant Engineers.

Before his service with the Tube Turns organization, he spent five and a half years with the Oldsmobile division of General Motors both at Kansas City and at Lansing, Michigan.

He will fly to Glasgow, Scotland, in the near future to confer with plant officials of the Scottish associate and to set up schedules for the shipment of manufacturing equipment to this country.

Corrosion Course

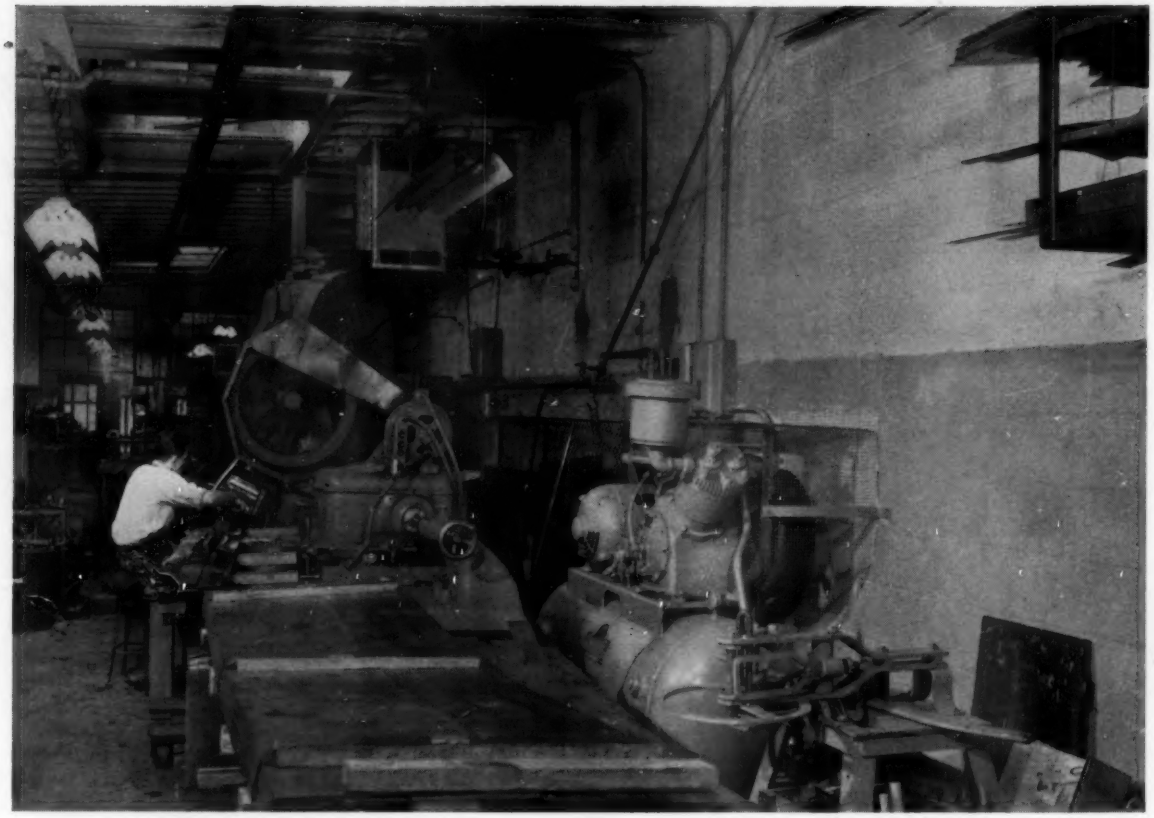
A FIVE-DAY short course on corrosion sponsored jointly by Washington University, St. Louis and Greater St. Louis Section, National Association of Corrosion Engineers, will be held from September 12 to 16 inclusive.

This course will include sessions on corrosion theory, metallurgical and mechanical factors, types of corrosion, designing to prevent corrosion, treatment of environments, selection of materials, cathodic protection and protective coatings. Readers desiring more information about this course should contact National Association of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas.

Illustration Mix-up

OUR ATTENTION has been called to a mix-up in two of the illustrations which appeared with the article "Fan Connections—Both Inlet and Outlet Design and Conditions Are Important," in the April, 1955 issue.

The illustrations for Figures 4 and 6, shown on page 92, should be transposed.



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

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LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

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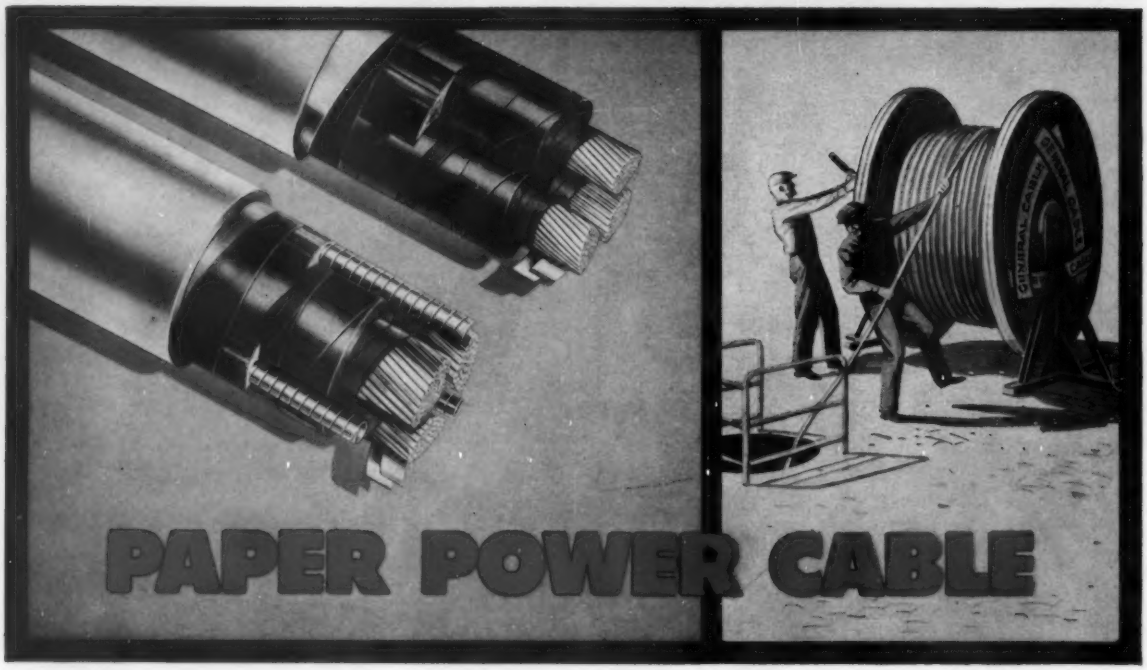
GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE



Pioneers in the development of Paper Power Cables, General Cable Engineering leadership and manufacturing skill is combined to provide a *uniformly high quality product.* Conductors are made to finest possible tolerances, insulations are thoroughly tested and inspected before and after assembly — in fact, *every* step of manufacture is under the most rigid quality control.

The biggest producer, General Cable also makes the widest range of types. For example: solid, low pressure gas-filled, low pressure oil-filled, high pressure oil-filled (pipe type), high pressure gas-filled (pipe-type), and high pressure oil or gas-filled (self-contained).

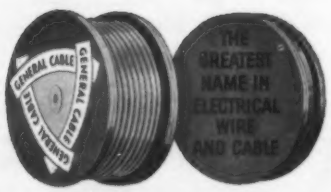
Available in widest range of conductors: Compack Round, Concentric, Compack Sector, Annular Concentric, Compack Segmental, Hollow Core.

Made in largest variety of finishes: Jute, Duck Tape, Reinforced Neoprene, Synthetic Plastics, Flat Steel Tape or Steel Wire Armor.

The forementioned represent but a few of the wide range of types manufactured by General Cable... plus other types made to customer specifications.

Next time you're talking Paper Power Cable . . . or any type of electrical wire and cable, call in your friendly General Cable Representative... there's one near you.

GENERAL CABLE
CORPORATION



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EXTRA VALUE..FROM GASOLINE TO SUN'S METALWORKING OILS

Sun Oil Company makes over 400 petroleum products ...refines better value into every one of them

Sun puts the same extra value into its metalworking oils that it puts into famous Blue Sunoco—Premium Performance at Regular Price.

EXAMPLE: About ten years ago Sun became aware of a hidden source of trouble in metalworking... inadequate lubrication of the ways which support the tables or carriages during a machining operation. The costly result of this inadequate lubrication is called "stick-slip" or jumpy table. This stick... slip...stick (or jump) is often less than a thousandth of an inch...hard to detect and yet enough to cause poor finish, rejects, reduced tool life and a fall-off in production.

SOLUTION: Sun developed its now famous Sunoco Way Lubricant—a product so outstanding in its ability to overcome "stick-slip" that today, more than ten years later, it still is the standard of the metalworking industry.

RESULT: The extra value of Sunoco Way Lubricant has been proved so conclusively that it is approved by more than 55 of the country's leading machine tool manufacturers.

For EXTRA VALUE in petroleum products... buy Sun!

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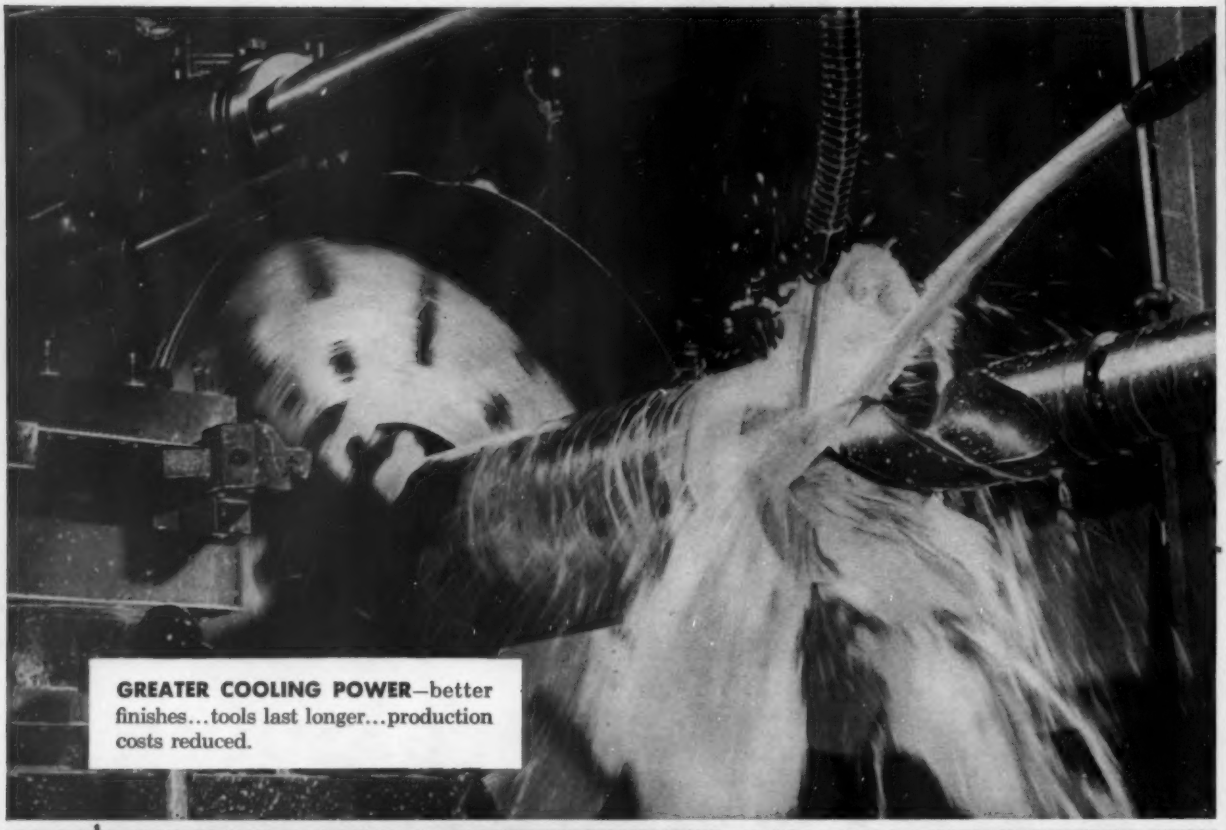
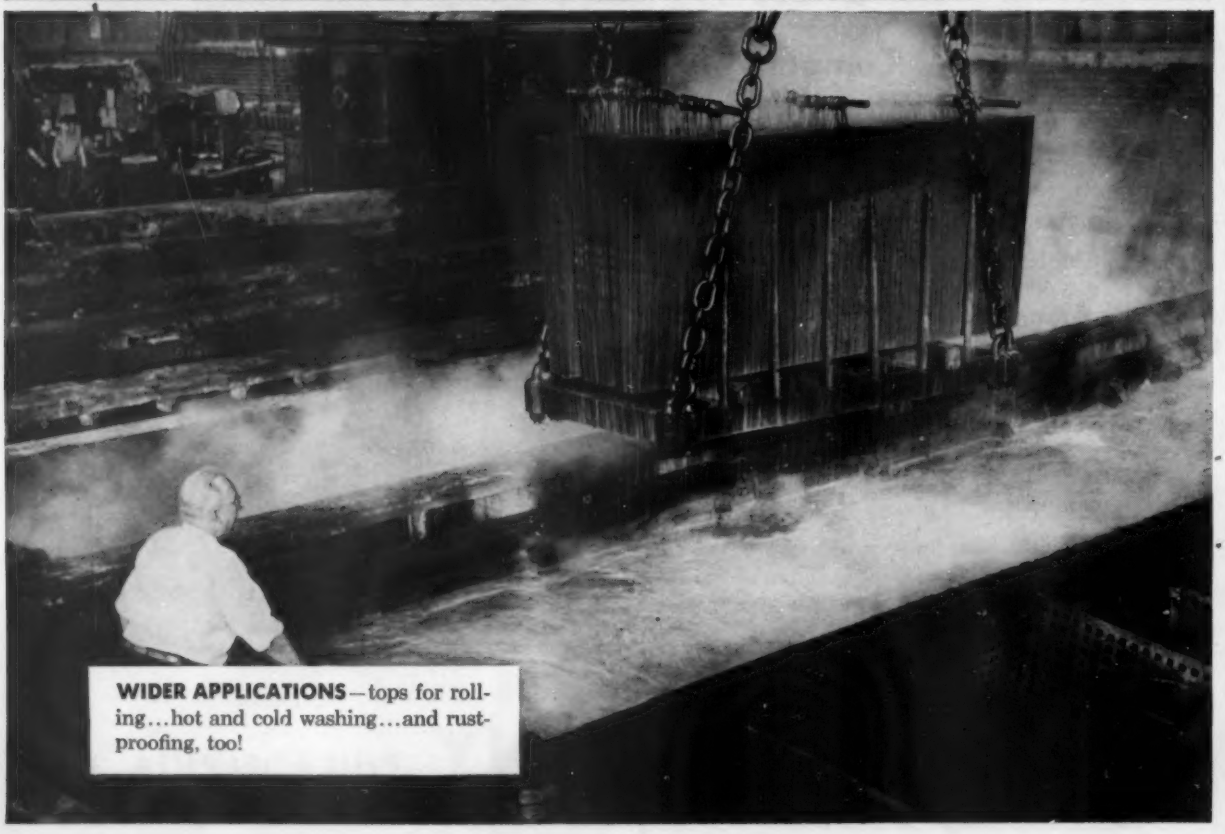
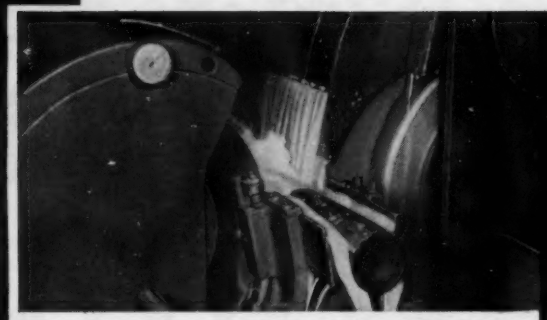


GREATER COOLING POWER—better finishes...tools last longer...production costs reduced.



WIDER APPLICATIONS—tops for rolling...hot and cold washing...and rust-proofing, too!



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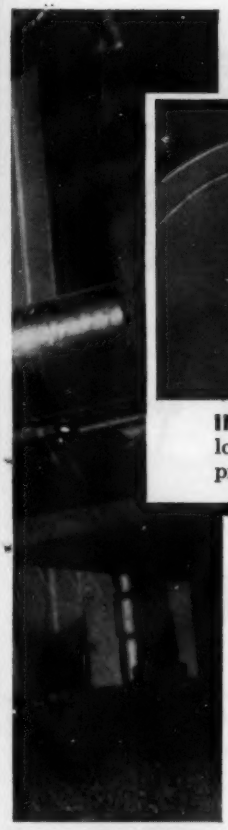
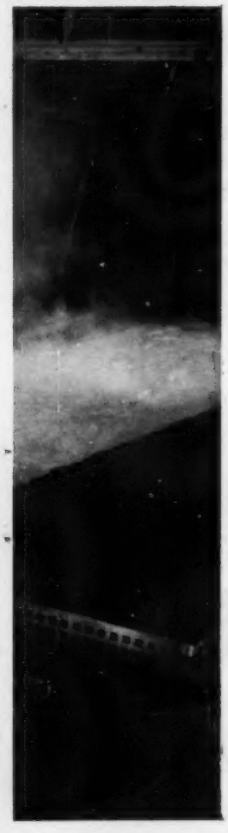
NEW S.E.C.O.—pours and mixes easily... has better operator acceptance... keeps parts and machines cleaner.





Industry's most widely used soluble cutting oil continues to give highest machining efficiency

OVER 100 MILLION GALLONS OF S.E.C.O. EMULSIONS USED IN '54

The reasons? Simple.
Primarily, industry has faith in Sunoco Emulsifying Cutting Oil. Its high machining efficiency has proven itself over a period of years. S.E.C.O. is the original 100% petroleum emulsifying cutting oil. 'Way back in 1916, machinists started using S.E.C.O.

Constantly improving in quality over the years, S.E.C.O. is now better than ever. During 1954 new refining facilities once more improved industry's most widely used cutting oil... gave users even higher machining efficiency ...better finishes...longer tool life... increased production.

Test the new S.E.C.O. in your own plant. Notice how its high detergency and purity keeps tools, parts and machines clean...how easily it mixes in hot, cold or hard water. Notice, too, how S.E.C.O. cuts operating costs... improves rolling operations, hot and cold washing, and rustproofing.

See for yourself why Sun's S.E.C.O. continues to be the leading emulsifying cutting oil in the country today. For information, call your nearest Sun office or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-7.

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THE BIGGEST

Announcing

THE LQ600 VALVE

ANOTHER LUNKENHEIMER "FIRST"
. . . the revolutionary new bronze valve which has broken all existing performance records!

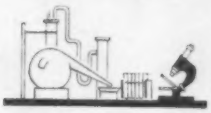
LUNKENHEIMER THANKS ALL OF THE LEADING COMPANIES WHO COOPERATED IN THE FOUR-YEAR LQ600 FIELD TESTING PROGRAM

The LQ600 Valve has been tested for four years in carefully chosen "problem installations" in American industry. *Despite the poor records of previous valves, there was not one single reported case of failure or leakage of an LQ600 Valve!* Here are a few typical records:

LUNKEN

THE ONE *Great*

BRONZE VALVE NEWS IN 50 YEARS!



This revolutionary bronze globe valve has set completely new performance standards in the most severe service in industry!

LQ600 gives you so much *more* service per dollar that you can't afford to continue using bronze globe valves that require constant repair and replacement!

Valve users, cooperating in a four-year testing program, were unable to find *any* service tough enough to wear out an LQ600 — or cause it to leak, even in the most severe throttling installations! This new valve is an investment — one that pays cash dividends in maintenance savings year after year!

BRINALLOY* SEATS AND DISCS make these remarkable performance records possible. This exclusive new Lunkenheimer alloy is far more resistant to wear and corrosion than 500 Brinell Stainless Steel — even outwears case hardened Stainless Steel exceeding 1000 Brinell! There is no need for renewability. *No LQ600 Valve in four years service has required maintenance.*

OTHER FEATURES — a streamlined new exterior . . . the famous Stemalloy® Stem, which far outlasts any other stem material . . . the cool, easy-to-grip Non-Slip® patented handwheel . . . durable, high-strength bronze in body and bonnet . . . and true back-seating, permitting safe and easy repacking under pressure.

*Patented alloy. Trade Mark, The Lunkenheimer Co.

For more information, call your local Lunkenheimer Distributor or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

TYPE OF SERVICE	LIFE OF OTHER VALVES	USER COMMENT
125 lb. hose steaming	2 wks. to 2 mos.	Toughest service, previous valves leaked.
Water col. blowdown	2 mos.	Plug valves couldn't take it.
185 lb. steam blowdown	1 yr.	Plug valves failed every year.
125 lb. steam blowdown	"Short"	Previous valve leaked every run.
200 lb. steam—water col. blowdown	2 mos.	Previous valves failed by wiredrawing.
Throttling syrup 140°F.	"Short"	Previous valves cut.
150 lb. throttling 380°F.	6 mos.	Plug valves failed regularly.
100 lb. throttling	2 wks. to several mos.	Plug valves couldn't hold up.
130 lb. throttling	8 mos.	Composition seat valves unsatisfactory.
110 lb. throttling steam	3 wks. to 3 mos.	Three other kinds failed.
Scaled hot water line	"Short"	About all makes used—none held up.
125 lb. throttling steam	6 to 12 mos.	Plug valves failed by wiredrawing.
150 lb. steam—scale present	"Short"	Previous valves broke.
150 lb. throttling steam	4 to 5 mos.	Other makes failed by wiredrawing.

HEIMER®

NAME IN VALVES

BRONZE • IRON
STEEL • PVC

L-455-4

Johnson waxes enthusiastic about GUSTIN gb BACON SNAP*ON

In the strikingly modern plant of the Johnson Wax Company in Racine, Wisconsin, molten wax flows through an extensive maze of piping. Steam tracers coil about the piping to keep these waxes fluid, and of course, insulation is a "must".

To insulate this piping, the Johnson Company selected lightweight G-B Snap*On, the one-piece molded pipe insulation of fine glass fibers. The fact that Snap*On is reusable was important to the company, since piping is frequently changed around to accommodate new processes. Johnson people were equally pleased with the ease of application and the snug fit of Snap*On over steam traced lines. And Snap*On's thermal efficiency — highest of any pipe insulation on the market — was still another deciding factor.

Because it is an all-purpose pipe insulation, Snap*On, with a vapor barrier jacket, was also selected to insulate chilled water lines in the Johnson plant. Snap*On is available in a wide range of pipe sizes up to 33", in a variety of wall thicknesses and jackets. If you, too, are looking for a new and better way to insulate cold or heated piping where temperatures do not exceed 350° F, write for the full story, on Snap*On . . . today!

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe coupligns and fittings • Molded glass fiber pipe insulation

244 W. 10TH STREET, KANSAS CITY, MO.

For more facts circle 509 on Reply Card

to meet your lighting requirements . . .

BENJAMIN "MAGNA-FLO"

goes to great NEW lengths!

To bring you Better Industrial Lighting, Benjamin "Magna-Flo" goes to great new lengths with these 5 IMPORTANT ADVANCEMENTS!

1. **Easy-to-clean "Life-Time" Porcelain Enamel with 85%-or-higher Reflection Factor.**
2. **Available with Diffuser-Reflector for Greater Upward Light.**
3. **Just 2 lengths of channels and 4 basic reflectors form backbone of "Magna-Flo" systems!**
4. **13° Shielding minimizes lamp glare.**
5. **Made for 48" and 96" T12 Slimline Fluorescent Lamps . . . 2 or 3-lamp units.**

No matter where you want fluorescent light . . . high ceilings or low ones, assembly or drafting rooms, inspection or mass-production lighting . . . there's a "Magna-Flo" System to exactly match the need. Bulletin 5705 brings you complete details. For your free copy write:

Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Ill.

CUT MAINTENANCE COSTS and RE-LAMPING TIME

with exclusive, rust-resisting, depressible, metal-clad "Springlox" Lampholders, featuring patented, instant-contact spring design.

BENJAMIN R-L-M

Sold exclusively through Electrical Distributors

B-871R

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Steam Generators of offer important savings

Advanced design features of Foster Wheeler "SC" Series Standard Steam Generators mean maximum economy of installation, operation and maintenance

FUELS: Oil or Gas

CAPACITIES: 50,000 to 150,000 lb/hr

STEAM PRESSURES: With superheat, to 1100 psi
Without superheat, to 1500 psi

STEAM TEMPERATURES: Saturated to 950 F

The "SC" Series Standard Steam Generator is the latest development by Foster Wheeler toward the reduction of steam costs for manufacturing and process plants. Pre-engineered in all details and standardized for economy, the new units are available in nine sizes with maximum inputs of 56 million to 201 million btu.

Although dimensions and structural details are fixed, the design provides a wide choice of temperatures and pressures, 48" or 54" upper drums, balanced draft or pressurized firing, type and location of heat recovery equipment, fans and drive, and make of burners for oil or gas firing.

The advanced features of this design, some of which are noted below, contribute to low installation, operating and maintenance expense and maximum dependability under continuous, full-load operation.

1. **COMPLETELY WATER COOLED FURNACE** with 3" OD closely spaced tubes minimizes setting maintenance and prevents excessive exit gas temperatures.

2. **OVER 19 FOOT FIRING DEPTH** permits long horizontal flame travel with minimum of ineffective or unused furnace volume.

3. **FULLY DRAINABLE SUPERHEATER,** available when superheat is desired, simplifies operation and eliminates a potential trouble spot.

4. **STEAM PURIFYING SYSTEM** consisting of horizontal separators, chevron driers and dry box provides steam purity of less than 1 PPM.

5. **EFFICIENT CONVECTION SURFACE** of 2" OD tubes in a staggered, cross-flow arrangement, combines maximum heat transfer with minimum draft loss. Single-pass boiler section eliminates baffles, dead gas pockets, and further reduces maintenance and draft losses.

6. **UNRESTRICTED CIRCULATION** — Absence of headers provides free circulation through integral risers and downcomers, eliminates header handhole plates and gaskets as possible sources of leakage.

7. **FULL INSULATION** together with the relatively close spacing of the furnace tubes, results in low casing temperatures.

8. **BOTTOM SUPPORTED UNIT** fully utilizes the structural strength of the steel tubes and provides for free expansion of all pressure parts within a stationary casing. This provides low unit stresses in all members and results in a rugged structure that is economical to erect and install.

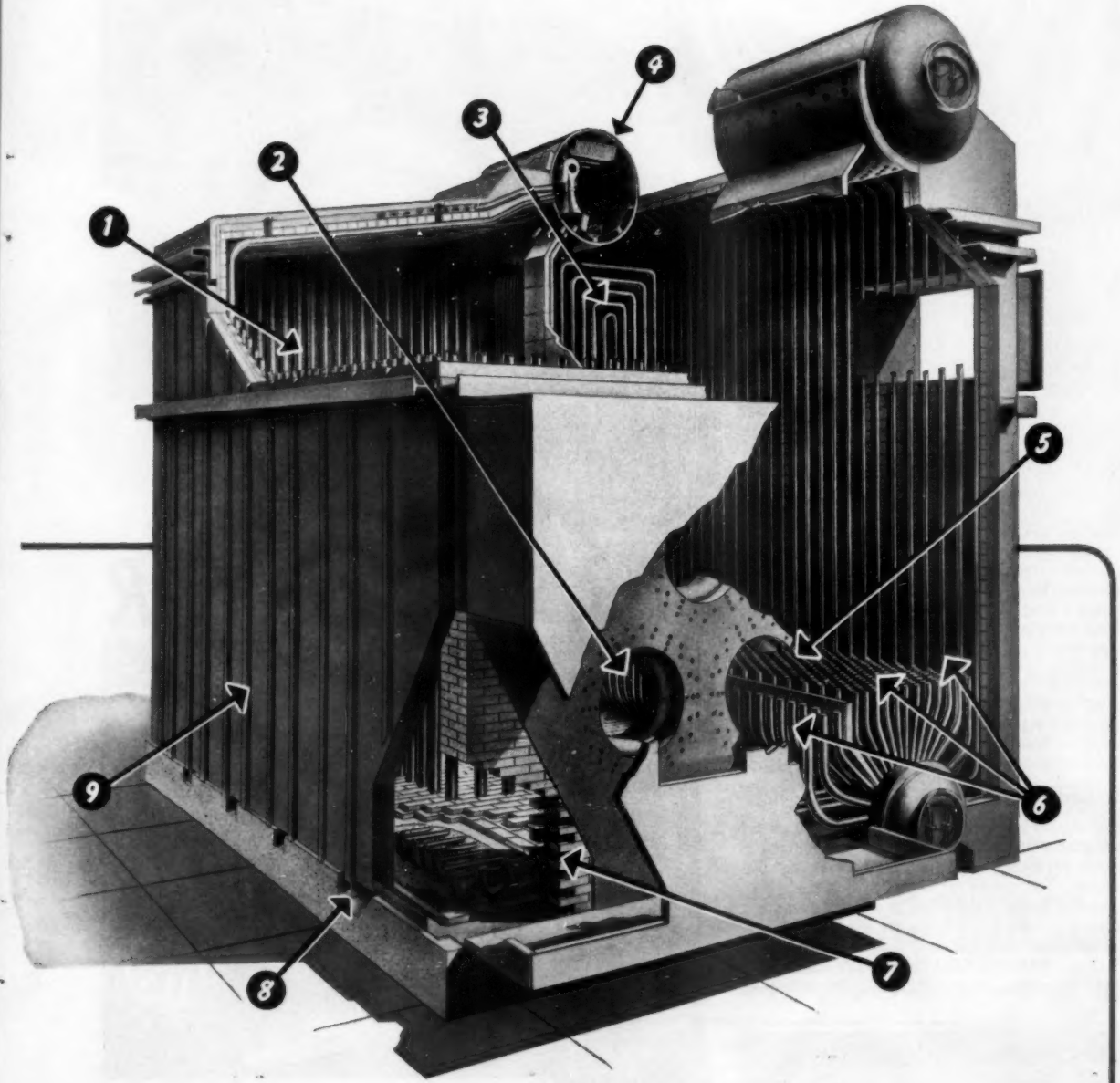
9. **ALL WELDED CASING** forms a rigid, pressure-tight unit. Possible sources of air and gas leakage are reduced to a minimum, thus providing lower operating costs through more efficient combustion.

LONDON • NEW YORK
PARIS • ST. CATHARINES, ONT.

FOSTER

STANDARD DESIGN

in industrial steam costs



WHEELER

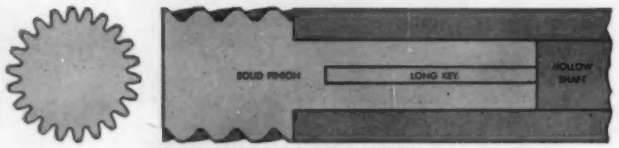
FOR COMPLETE INFORMATION on the "SC" steam generators, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

For more facts circle 511 on Reply Card

In your opinion, which pinion?

. . . for longest life in a gearmotor

ORDINARY SHELL TYPE PINION



U. S. SOLID TYPE PINION

In an internally geared motor the pinion on the motor shaft is the vital link between motor and gearing. It's the fastest, but smallest gear, so it must be extra strong, free from vibration and forever tight. Now compare the U. S. Syncrogear motor pinion with the ordinary type. Note the extra large section area of the U. S. design. It has a long solid shank that anchors into the motor's hollow shaft, whereas the ordinary shell type has a small section area, short keyed.

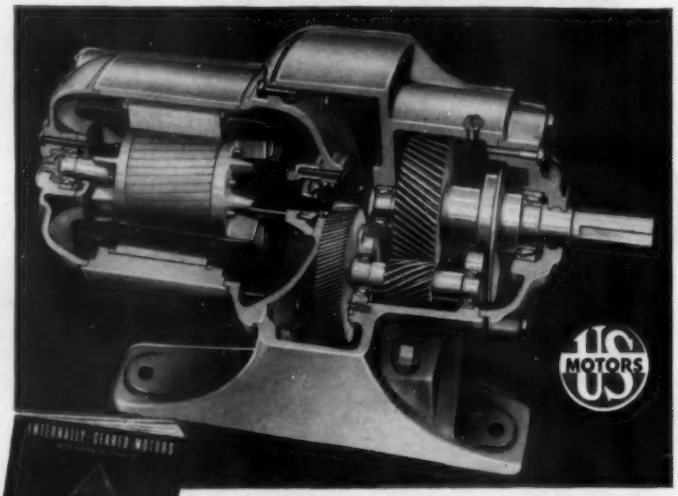
Obviously the U. S. design is most substantial, longer lasting, more resistant to deflection and can carry high speed loads far more safely than common designs. All the gears are deep-hardened and shaved to exact tolerances in the U. S. plants.

Added life lengthening features

The rugged pyramidal case supports the motor and gear train and all castings are normalized to insure permanent alignment and to prevent distortion. The motor windings are asbestos-protected to avoid carbonization and guard against burnouts. All moving parts are completely enclosed for weather and dust protection and confined within the least cubical dimensions on a single mounting. ¼ to 30 h.p.; 10 to 10,000 r.p.m.

THE ONLY MOTOR WITH A BUILT-IN PINION

U. S. SYNCROGEAR



FREE 16-PAGE DESCRIPTIVE BOOKLET GIVES ALL THE FACTS

Interesting multi-colored Booklet presents engineering facts you should know about geared motors, and illustrates the various U. S. Syncrogear types. Mail the Coupon for a copy. No obligation.

U. S. ELECTRICAL MOTORS Inc.

Los Angeles 54, Calif. **Milford, Conn.**

U. S. Electrical Motors Inc. PE-7
Box 2058, Los Angeles 54, Calif. or Milford, Conn.

NAME_____

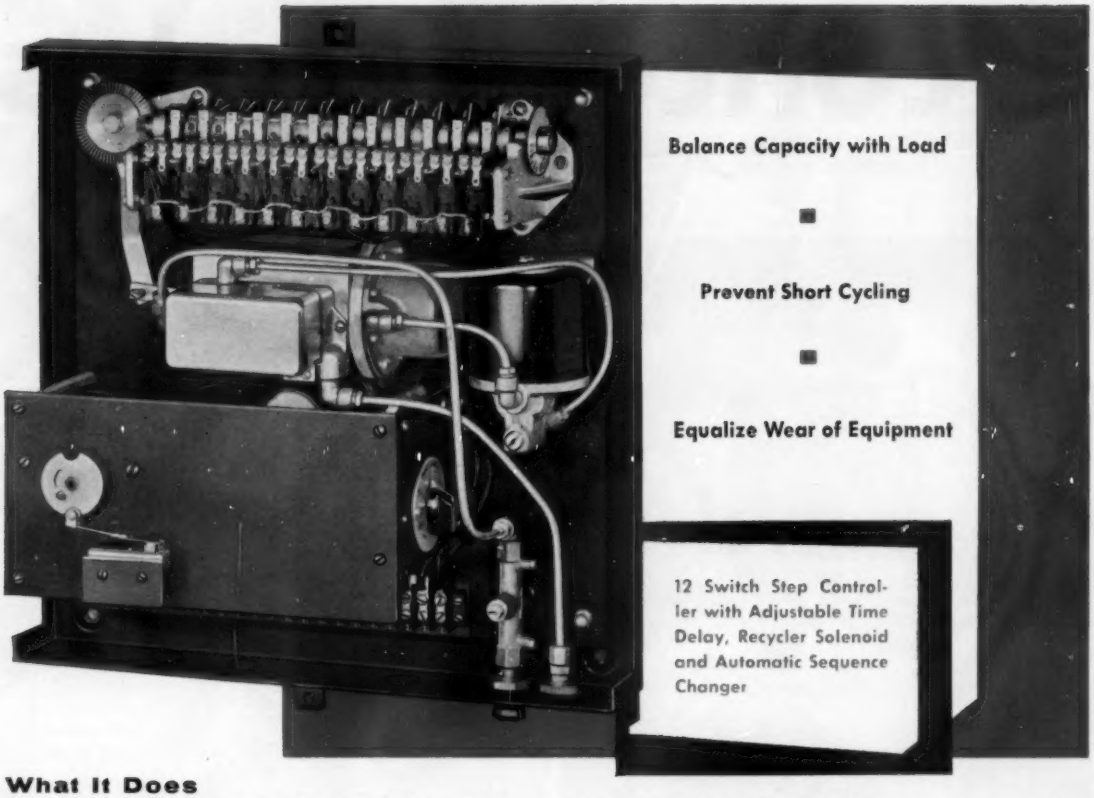
COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

For more facts circle 512 on Reply Card

JOHNSON PNEUMATIC STEP CONTROLLER FOR CAPACITY CONTROL OF REFRIGERATION MACHINES


Balance Capacity with Load
Prevent Short Cycling
Equalize Wear of Equipment
12 Switch Step Controller with Adjustable Time Delay, Recycler Solenoid and Automatic Sequence Changer

What It Does

This new and improved controller is designed to accomplish, with a single compact unit, everything that is desired for the control of multiple step refrigeration installations, including "on" and "off" operation of the steps in sequence, positive prevention of the starting of more than one compressor at a time after night shutdown or after current failure, and manual or automatic changing of compressor operating sequence to equalize wear. It can be used to control one or a group of refrigeration machines. It completely eliminates all the disadvantages of a series of separate pressure switches.

How It Works

The Johnson Pneumatic Step Controller, responding to changes in control pressure from a Johnson Pneumatic Thermostat or other regulator, actuates a number of separately adjustable, snap-acting, single-pole, double-throw switches in any desired sequence. Control arrangements include (1) starting and stopping two or more compressors in sequence, (2) operation of cylinder unloaders in sequence, or (3) a combination of (1) and (2).

Special Features

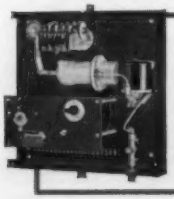
Recycler and Time Delay—Recycler Solenoid immediately returns all switches to their normal position on shutdown or current failure. Time Delay assures the proper interval between successive switch operations on start-up or when current is restored after failure.

Sequence Changer—Varies the starting sequence of compressors to equalize running time and wear. Step Controllers are furnished with either Manual or Automatic Sequence Changer.

Models—Choice of 4, 6, 8 and 12 switch units, with or without special features such as Recycler, Adjustable Time Delay and Sequence Changer.

* * *

Installation and operation of the Johnson Pneumatic Step Controller is both simple and inexpensive. A nearby Johnson engineer will gladly explain, without obligation, how it can best solve your special problems, or write today for full details.



OTHER APPLICATIONS

Johnson Step Controllers are also used to control multiple fan or pump installations, electric heaters and other systems where electrically actuated devices are to be operated in sequence from a proportional acting pneumatic controller. Send the coupon for more facts.

JOHNSON CONTROL

TEMPERATURE AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885

JOHNSON SERVICE COMPANY
507-R East Michigan St., Milwaukee 2, Wisc.

Please send me Apparatus Bulletin G-180 describing specifications, features and application of Johnson Pneumatic Step Controllers.

NAME_____

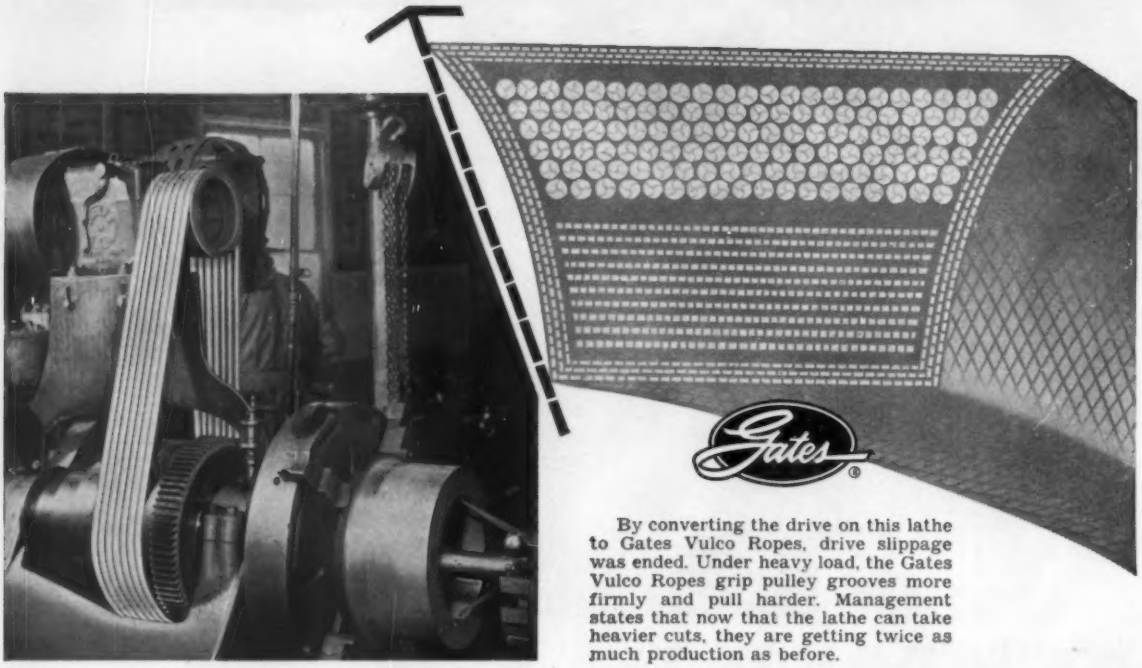
FIRM_____

ADDRESS_____

CITY & STATE_____

For more facts circle 513 on Reply Card

"Secret" of *lower* belt costs is concave sides



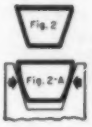
By converting the drive on this lathe to Gates Vulco Ropes, drive slippage was ended. Under heavy load, the Gates Vulco Ropes grip pulley grooves more firmly and pull harder. Management states that now that the lathe can take heavier cuts, they are getting twice as much production as before.

Plants that keep track of costs on drives know this: they get longer wear at *lower cost per year of service* when they specify Gates Vulco Ropes—the V-Belts with *concave sides.*

Here's WHY concave sides keep belt costs down:

When the Gates belt is bent around the sheave, the *precisely engineered* concave sides (Fig. 1) fill out and become straight (Fig. 1-A). Thus the belt makes uniform contact with the sides of the pulley.

This full, uniform contact assures *even distribution of wear.* Naturally, *even wear* means *longer wear.* And longer wear cuts belt replacement costs...reduces down time...contributes to profits.



Prove to yourself the value of concave sides

Bend a straight-sided belt (Fig. 2) and feel the sides *bulge out* around the bend. You see immediately that the bulging sides prevent an even fit in the pulley groove (Fig. 2-A). Uneven contact causes faster wear...increases belt replacement costs.

Reduce costs and down time for belt replacements—specify Gates Vulco Rope Drives—the V-Belt with *concave sides* (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-Belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 46-A

GATES VULCO ROPE DRIVES

For more facts circle 514 on Reply Card

IT'S LYON

5 TO 1

• Key men in companies throughout the country have given Lyon five times more first choice votes than any other steel equipment manufacturer! And more than the next thirteen combined!

Those are the findings of a nationally known research organization that asked executives in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's most diversified and most preferred line of quality steel equipment. (A few are shown below.) Equally important, he can show you how to get the most out of steel equipment in time, space and money.

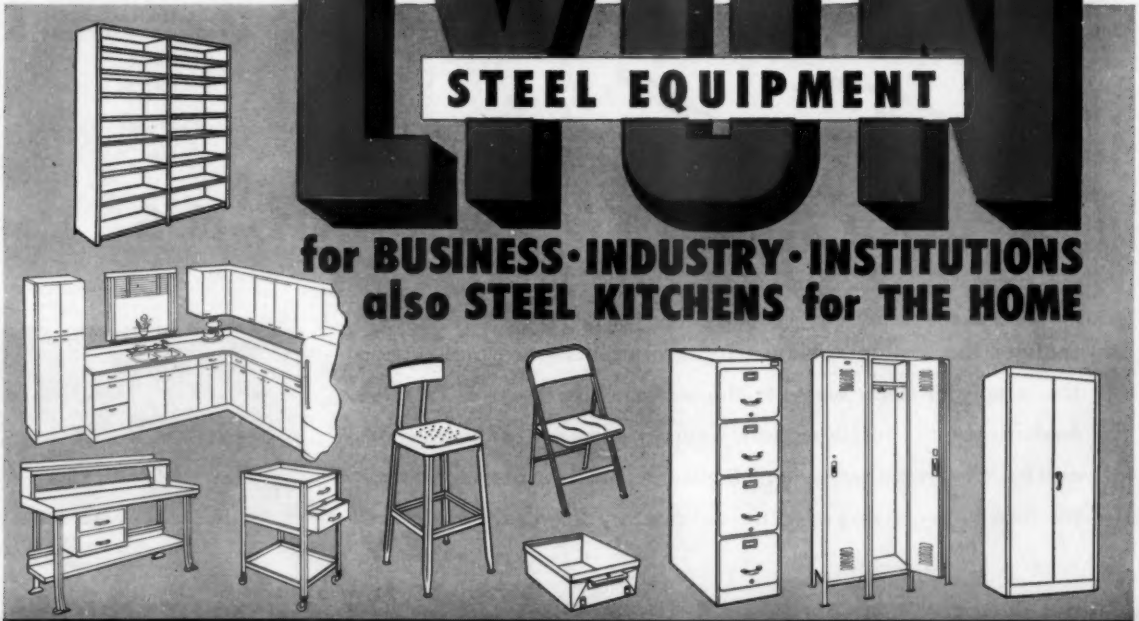
LYON METAL PRODUCTS, INC.
General Offices: 791 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities

Lyon also has complete facilities for manufacturing special items to your specifications.

LYON®

STEEL EQUIPMENT

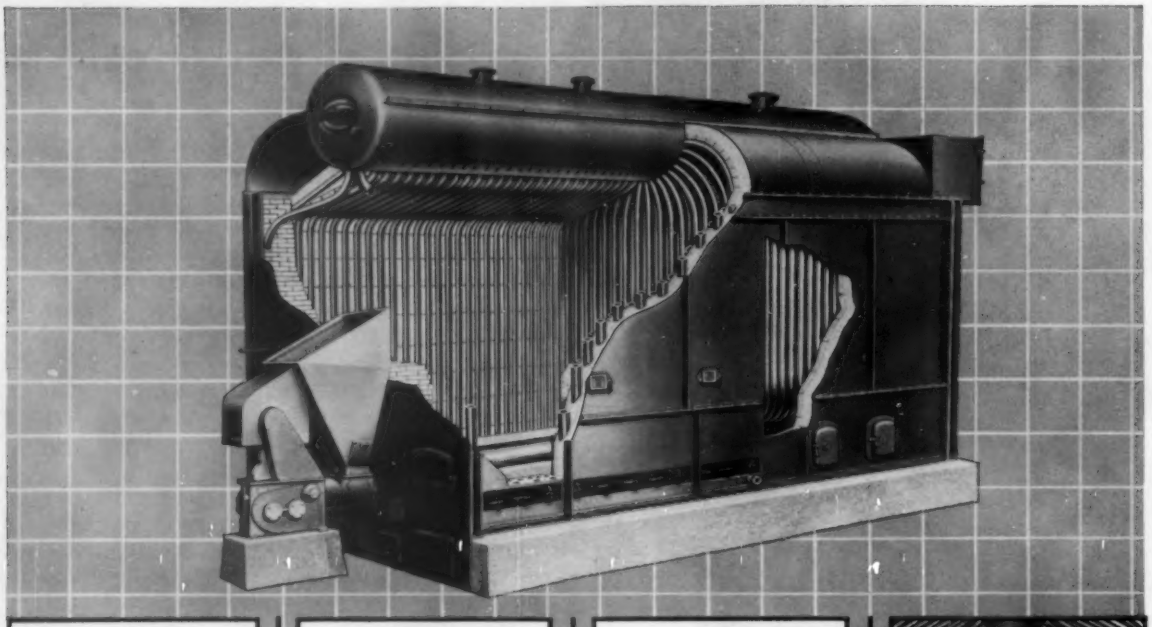
for BUSINESS • INDUSTRY • INSTITUTIONS
also STEEL KITCHENS for THE HOME

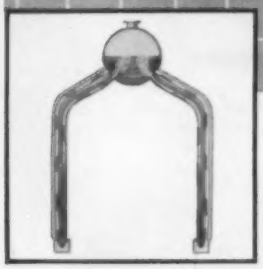


A PARTIAL LIST OF LYON STANDARD PRODUCTS

• Shelving	• Kitchen Cabinets	• Tool Toters	• New Freedom Kitchens	• Flat Drawer Files	• Folding Chairs	• Service Carts	• Tool Stands
• Lockers	• Cabinet Benches	• Bar Racks	• Display Equipment	• Revolving Bins	• Coat Racks	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Filing Cabinets	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

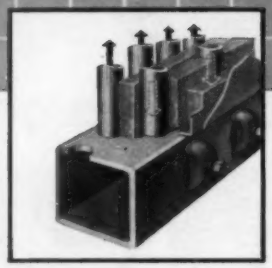
For more facts circle 515 on Reply Card





RING-FLOW CIRCULATION IN EACH WATER WALL ELEMENT

POSITIVE WATER SUPPLY TO WATER WALLS



WATER WALLS ACCESSIBLE FROM OUTSIDE THE SETTING

LOW FURNACE ROOF PROTECTS BOILER TUBES

Exclusive
ERIE CITY DESIGNS

The VI factory assembled or field erected, has EXCLUSIVE features that assure minimum furnace maintenance and a positive supply of clean water to the water walls. These EXCLUSIVE features are the result of many years of experience in designing and building two drum boilers; thousands of which are operating in the field today, giving users the satisfactory service they demand.

WE PAY ROYALTIES TO NO ONE FOR THESE DESIGNS

ERIE CITY
115 Years in Steam Generation

You can depend on Erie City for sound engineering

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS
UNDERFEED AND SPREADER STOKERS • PULVERIZERS

For more facts circle 516 on Reply Card

BULLETINS just released and of immediate plant interest

MATERIALS HANDLING

101 Conveying Equipment—This 16-pp catalog shows gravity wheel and roller conveyors and related accessories—spur curves, hinged sections, diverters and aluminum sections. Also included are power belt conveyors from lightweight aluminum models to heavy-duty interfloor and horizontal steel models; a conveyorized storage rack; guided pallet conveyor; others. Catalog provides specifications and general data; shows applications. The Rapids-Standard Co., Inc.

102 Standard, Special Conveyors—Forty-pp Catalog 400 gives descriptive and application data on company's featured products and custom built equipment. Presents an automatic elevator for handling small parts magnetically; an enclosed bulk material conveyor with two-directional chain; a piano hinge steel belt conveyor elevator; and welded tube piano hinge steel belt conveyor. Typical layouts are diagrammed and pertinent engineering data provided. Prab Conveyors, Inc.

103 For Overhead Handling—Bulletin M-28 tells how Trambeam overhead handling equipment can provide efficient, precision handling in machining areas of the plant. Explains how machine operators at one plant use the cranes with pendant, push-button controls to position safely parts weighing as much as 10 tons. Installation photos included. Whiting Corp.

104 Hoisting Equipment—Eight-pp Bulletin PU-50-1 presents this company's line of hand chain hoists, electric hoists, and trolleys, giving application suggestions, capacities, dimensional data and prices. Featured items include the Lodestar, an electric chain hoist with push button control, and the Comet, with pendant rope control, and the Meteor, a wire rope electric hoist. Brief data on cranes is provided. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

105 Sling Chain Check List—Designed to facilitate chain selection, this sling chain chart identifies the various types of sling chains and indicates specifications and working load limits of one, two, three, and four branch slings when used at 60, 45, 30, and 10 deg angles. Also contains information on how to use and care for chains. The McKay Co.

106 Elevating Equipment — Bulletin 548-R, 16-pp, features company's line of portable hand-operated and electric elevators. Descriptions and photos of each model are given, construction features are pointed out. Platform and cable safety devices, auxiliary equipment, motor unit are treated. West Bend Equipment Corp.

107 Operatorless Tractor—Bulletin 552-1, 8-pp, describes and illustrates the Guide-O-Matic tractor, which moves trailer trains to prescribed destinations without an operator. Points out design and operating features of the completely automatic trackless tractor-trailer system. Barrett-Cravens Co.

108 Automated Warehousing—This brochure presents an automated warehousing system designed to provide advantages of both bulk picking and order picking. The bulk picking method is facilitated through an automatic conveyor system directed by electronic controls. Bulletin explains method of operation of this system which is applicibale in industries which distribute case and broken lots of a wide variety of products. Picture of a prototype system is included. Walter Kidde Constructors, Inc.

109 Casters and Wheels—Technical data on company's line of casters and wheels for light through heavy-duty use on all types of portable equipment is presented in this 28-pp catalog. Photos and specifications, plus a section on special types available to supplement the standard units, are included. Information on how to select right equipment for specific load and floor conditions is given in charts and tables. The Rapids-Standard Co., Inc.

110 For Small Parts Handling — Eight-pp Catalog DN-1000 presents a handling system for small parts designed to cut handling costs, facilitate good housekeeping, afford other benefits. Photos show how system is based on use of nesting boxes in which parts are stored and transported. Standard boxes and expanded metal baskets are pictured, and specifications provided for these and for hopper racks, shelf racks. The Chas. Wm. Doepke Mfg. Co., Inc.

111 Portable Dock—A new idea in loading and unloading motor trucks is described in Bulletin 151, on the Porta-dock. Shows how this portable dock can be used on any hard surface, is hinged to fold compactly for easy storage, will elevate and lower 60-lb loads. The Raymond Corp.

112 Wooden Containers—This 16-pp cartoon-type fact booklet emphasizes wide range of uses for nailed wooden boxes and crates, including industrial shipping boxes, appliance crates, beverage cases and fruit and vegetable containers. Inherent characteristics and careful design of nailed wooden boxes, according to booklet, make this type of container desirable in many applications. National Wooden Box Association.

CONSTRUCTION

113 Luminous Ceilings—New ways to increase lighting efficiency, economy and design flexibility are suggested in this illustrated brochure. Contains photos of installations of rigid vinyl sheets; stresses uniform light transmission, excellent aging characteristics, safety, ease of installation, lower maintenance and cost, other advantages. Bakelite Co. Div. of Union Carbide and Carbon Corp.

114 Acoustical Plastic—"The Silent Treatment," 8 pp, features vermiculite acoustical plastic and its applications, stressing its advantages for sound conditioning, fire safety, and beauty. Contains table of physical data, standard specifications for manual and machine applications, and sketches of the two constructions granted 4-hr fire ratings. Vermiculite Institute.

115 Steel Grating and Treads—Bulletin 2486, 16-pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications, and includes specifications, photos and diagrams. Blaw-Knox Co.

116 Serrated Grating, Treads—Bulletin RR-255-A, 8 pp, describes and illustrates open steel floor grating and stair treads with serrated surface for greater safety. Presents four types and gives detailed selection information to aid in choosing proper grating for load-span conditions. A. O. Smith Corp.

VIBRATION CONTROL

117 Improved Machine Mountings—Bulletin K4A, gives engineering specifications and performance data on vibration, shock and noise control products. Presents 11 types of vibration isolating units which utilize steel springs, rubber and cork—singly or in combination. Discusses merits of springs and organic materials and tells under which conditions the various media perform best. A selector chart shows recommended and alternate methods of isolation. The Korfund Co., Inc.

118 For Estimating Grout Requirements—This pocket-size card aids in estimating grout requirements of heavy equipment, machinery, anchor bolts, building columns. Lists yield and estimating figures for one 100-lb bag or pail, a cubic yard of flowable grout, and 100 sq ft of flowable grout 1 in. thick. Estimating procedure is outlined. Master Builders Co.

PUMPS, COMPRESSORS

119 Controlled Volume Pumps — Bulletin 953, 24-pp, describes and illustrates use of controlled volume pumps in industrial water treating systems. Construction and operation features are described, capacity-pressure ranges and speed and stroke length adjustments are charted. Typical chemical feed and water treating systems are presented through text and diagrams, and an analysis of boiler water treating systems, cooling water treating problems, and systems for waste and sanitary water treatment is included. Milton Roy Co.

120 Centrifugal Pumps—Built to handle high static heads, the pumps described in 6-pp Bulletin 350 feature single-stage, double-suction centrifugal design. A large cutaway illustration shows construction details of the pumps. General and metal specifications are provided, and tables give performance data on pumps from 85 to 4500 gpm, heads to 195 ft. American-Marsh Pumps, Inc.

121 For Efficient Pumping—Bulletin 52 B 6083C, 6-pp, discusses easy installation and maintenance and other advantages of company's "Electrifugal" pumps, available in capacities to 2500 gpm, heads to 400 ft and temperatures to 250 F. Pump types described include those having a casing with removable suction cover and those having a casing with suction and discharge nozzles in one piece. Alternate sealing arrangements described. Allis-Chalmers Mfg. Co.

122 Two-Stage Pumps—Bulletin C-1054 describes company's two-stage Type DMD pumps. Construction features are illustrated, including dimension tables for various pump sizes. Economy Pumps Div., C. H. Wheeler Mfg. Co.

123 Sanitary Pumps—Fourteen-pp Catalog Section F describes Sanitor pumps, rotary pumps designed for use in food and dairy industries. Presents a pump with mounting bracket and stub shaft, V-belt drive units, gear drive units, direct connected Straitline units, variable capacity units, belt drive units. Also describes a model, engineered for utmost in sanitary construction, which incorporates a 1200-rpm motor and totally enclosed V-belt drive. Selection information, performance graphs are included. Viking Pump Co.

124 Pumps in Paper Mills—Sixteen-pp Bulletin 455 shows how paper mill operators can effectively employ controlled volume pumps to meter chemicals in stock preparation, bleaching, coating, slime and foam control and in water treating. Actual case histories of installations cover use of controlled volume pumps to upgrade product quality, eliminate chemical waste and produce high quality paper at low cost. Milton Roy Co.

125 Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. C. A. Dunham Co.

On pages 165-166 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

126 Pumps and Compressors—Bulletin 603, 6-pp, is a brief catalog describing company's line of air and gas compressors, dry vacuum pumps, check valves, aftercoolers, and centrifugal pumps for handling water and aqueous solutions including boiler feeding. Photos, descriptions, and specifications on the various types of machines are offered. Pennsylvania Pump & Compressor Co.

127 Two-Stage Compressors—Bulletin 16B-8244 describes company's line of two-stage sliding vane type compressors for shop air, gas handling, drilling, and other applications. In addition to a table of ratings for two-stage compressors, bulletin carries a table of outline dimensions for the units. A sectional view shows component parts. Allis-Chalmers Mfg. Co.

128 For On-the-Spot Air—Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustra-

BULLETINS

(Begins on page 21)

tions pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

PACKINGS

129 Rubber Packing—Sheet rubber packing material made by company's Rotocure process, is described in this illustrated bulletin. Points out advantages—such as stability, smoother finish, better gage control. Covers applications, sheet and sizes; gives government specifications. Boston Woven Hose & Rubber Co.

130 Molded Rubber Products—Eight-pp Bulletin H-20 presents line of molded rubber goods and industrial sheet packing. Contains specification chart comparing qualities of six types of natural and synthetic rubber used by the company in manufacture of molded products for original equipment manufacturers. Lists 10 all-purpose pure gum and synthetic rubber sheet packings. Hewitt-Robins, Inc.

MECHANICAL POWER TRANSMISSION

131 Adjustable Speed Drives—Bulletin PB-4700-1 describes company's packaged adjustable speed drives—covering latest developments in design and construction. Tells how these packaged, pre-wired, pre-assembled units provide flexibility of d-c motor performance from an a-c power supply, and offer simple, convenient speed adjustment without intermediate speed changing equipment or line shafting. Crocker-Wheeler Div., Elliot Co.

132 Variable Pitch Sheaves—Stationary and motion control "Vari-Pitch" sheaves for speed variations up to 76 per cent by means of pitch diameter adjustment, capacities 1 to 600 hp, are described in Bulletin 20B6082C. Included is a table of sizes. Allis-Chalmers Mfg. Co.

133 Automatic Speed Control—Eight-pp Bulletin 1882, illustrated in full color, shows how an improved pneumatic control, called Varitrol, has been designed into this company's Varidrive motors to increase and/or improve output of product, cut waste, save time and man power. Photos explain how use of the Varitrol provides stable automatic control which permits Varidrive's speed to be controlled by pressure, temperature, humidity, flow rate, liquid level. U. S. Electrical Motors Inc.

134 Bearing Lubrication—Bulletin 506 offers lubrication and maintenance data for ball and roller bearings. Helpful lists of "do's" and "don'ts" to prolong bearing life, and facts on storage and handling of lubricants are included. New York & New Jersey Lubricant Co.

ELECTRICAL

135 Dripproof Motor—This 12-pp booklet, Form F-1856, illustrates various features of company's Type H Uniclosed motor. Cut-open views, illustrating constructional features, are shown in full color. A series of drawings with call-outs shows how Ventrifoil at both air intakes of the motor protects the interior. U. S. Electrical Motors Inc.

136 Small Motor Switches—This 14-pp booklet describes a line of toggle, rotary and push-button switches—popular types designed to meet requirements of manufacturing, plant maintenance. Generously illustrated, this booklet also includes complete rating tables. Cutler-Hammer, Inc.

137 Twist Prong Capacitors—Form UPX-155 is an 18-pp twist prong capacitor cross-index and price list of recommended replacements for several leading brands. Over 1000 twist prong capacitor types are listed for quick interchangeability, along with the stock numbers and approximate price of company's equivalent. Cornell-Dubilier Electric Corp.

138 Improved Insulation—Twelve-pp Booklet B-6506 explains advantages of Thermalastic insulation, designed to extend life of generators, synchronous condensers, frequency changers, large motors and other heavy rotating equipment in hard service. Contains a short, illustrative story on development of the insulation, describes properties, and includes application photos. Westinghouse Electric Corp.

139 High-Power Batteries—Bulletin CP-538/55 covers company's line of Hi-Power batteries for use in the control, switchgear, emergency lighting and auxiliary power fields. Includes data on battery ratings and capacities, details of design and construction, dimensions, weights and types of containers. C & D Batteries, Inc.

140 Liquid Rheostat—Bulletin 14B8231, 8-pp, describes design features of company's liquid rheostat (Type 257) employing a complete NEMA 1 enclosure and other improvements. Points out advantages, discusses principle of operation and various applications. Approximate weights and dimensions are listed. Allis-Chalmers Mfg. Co.

141 Repainting Transformers—Eight-pp Bulletin GET-677F discusses problems involved in repainting transformers in the field, and presents some pertinent facts on how to assure longer paint life. Discusses methods of applying paint, paint preparation, number of coats required, and repainting of subway transformers. General Electric Co.

142 Fixture Suspension System—Catalog FF-4, 6 pp, describes a system of fluorescent fixture suspension. Information on parts, suspension and assembly procedure and installation is explained in detail. Also shown are various channels and wire sizes, UL approved for using the system as a surface metal raceway—to suspend and power fluorescent fixture installations. Line drawings and installation photos show how this system requires fewer hanger stems and canopies, and affords other advantages. Unistrut Products Co.

143 Portable Cords—Three types of portable cords for rugged applications are described as to construction, advantages and applications in this 8-pp bulletin. They include company's Securityflex cord for the most rugged uses; a Neoprene-Jacketed type for severe industrial uses; and a rubber-jacketed type for hard service applications. Properties and specifications are included. Anaconda Wire & Cable Co.

DUST CONTROL

144 Dust Control—Bulletin 554-D discusses methods of dust control in industries concerned with building materials. It is made up of four illustrated case histories showing how company's cloth-filter-type dust collectors are employed in ready-mix concrete plants, roofing manufacturing companies, woodworking plants, and wallboard cement plants. American Wheelabrator & Equipment Corp.

145 Toward Foundry Cleanliness—Immediate steps toward achieving better, safer and cleaner working conditions in foundries are covered in Technical Bulletin F-126. Describes products that can help hold foundry dust to a minimum and points out benefits of company's Dustless Kleenair Seacoal and King Kore (pitch) Kompound, other products. Frederic B. Stevens, Inc.

146 Centrifugal Air Washers—Bulletin W-55 discusses company's principle of centrifugal air washers for wet dust collection. Among the applications listed are control operations for carbon black, soapstone, talc, pigments, and other powders liberated in the manufacturing of rubber goods. Cites specific applications in the recovery of fines from soaps, detergents, food products, drugs, chemicals, ceramics, and wallboard. The Ducon Co.

FIRE PROTECTION, SAFETY

148 Fire-Venting Protection—Fire venting as a means of retarding the spread of fires in buildings is discussed in this 8-pp bulletin. Company's self-contained Pyrodomes and Pyrovents are described and pictured in detail. Also included is list of industrial and other building occupancies classified according to severity of fire hazard. Wasco Products, Inc.

149 Protective Helmets—Bulletin 0600-3, 16 pp, describes a line of protective helmets for industrial workers and others. A pictorial essay traces each step in the molding of Skullgards, and describes the testing processes. Along with descriptions of reinforced and high-pressure plastic headgear, descriptions of hats made of glass fiber and aluminum are given. Mine Safety Appliances Co.

HEATERS AND HEAT EXCHANGERS

150 Unit Heaters—Publication B-1720, 24 pp, introduces a line of propeller fan heaters suitable for both steam and hot water. Design and construction features of the heaters are explained and illustrated. Basic steam and hot water capacities are tabled and information on selection of steam and hot water units provided. Booklet also gives mounting suggestions, includes piping and wiring diagrams, dimensional details. The 24 sizes in this line range from 63 to 1395 sq ft EDR basic steam ratings. Warren Webster & Co.

151 Space Heaters—Case Study 560-70 tells how flexibility of oil fired, warm air space heaters was put to good use in designing a heating system for a large receiving and shipping terminal. Explains how positioning, versatility and extensive air throw of the units afforded ample protection for fruit against freezing. Dravo Corp.

152 Gas Unit Heaters—Bulletin B-55-US presents specifications, dimensions and construction details on suspended gas unit heaters. Includes propeller fan and centrifugal blower powered units in eight sizes 25,000 to 200,000 Btu plus a new twin-fan 250,000 Btu model. Reznor Mfg. Co.

153 Fuel Oil Heating—Eight-pp Bulletin 1644B discusses electric heating of fuel oil suction piping and thermostatically controlled electric line heaters for No. 6 oil. Some typical electric oil heating systems are diagrammed. Booklet covers use of electric line heaters, ribbon heat, and suction stub electric heaters. Preferred Utilities Mfg. Corp.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 165-166. Of course we honor letterhead requests—but it takes us a bit longer to handle them.

154 U-Type Heat Exchangers—An expanded line of standard U-type heat exchangers is presented in two 12-pp catalogs. Form GN-1054 lists capacities for a wide range of applications for Type SU heat exchangers—designed for heating a liquid with condensing steam and constructed for 150 psi working pressure. Form GC-1054, on Type WU heat exchangers, describes standard shell and tube units that use boiler water for heating. In addition to heating applications, these units may be used to cool condensate. Bell & Gossett Co.

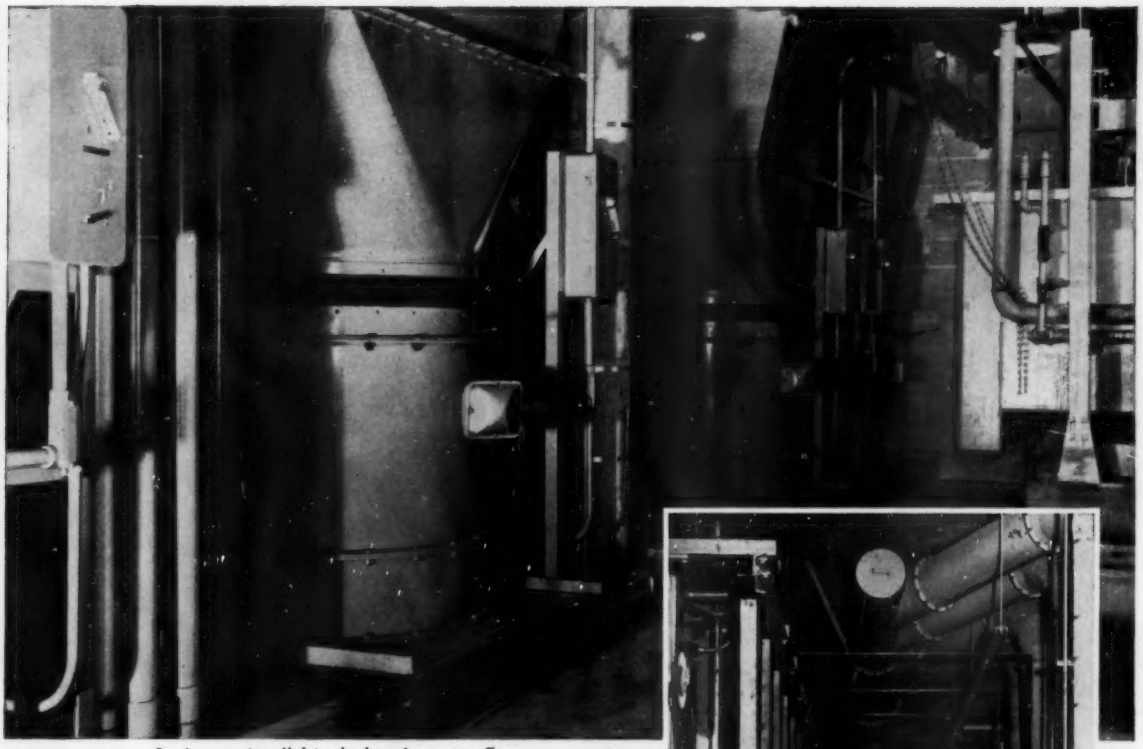
155 Heat Exchangers—Catalog 1155, 4 pp, on single pass and multipass stainless steel heat exchangers, provides data on applying them for heating or cooling liquids and gases used in chemical, pharmaceutical, refining and allied processing industries. Styles, sizes, dimensions, weights and materials of construction are given. A cutaway view shows major design features. Young Radiator Co.

BUILDING MAINTENANCE

156 Tips on Washroom Maintenance—This brief, 4-pp, easy-to-follow manual gives a step-by-step daily schedule of washroom maintenance. Shows what jobs should be done and how to do them. A schedule for weekly washroom care is also included. Huntington Laboratories, Inc.

157 Power Sweepers—The advantages of company's line of power sweepers for industrial and commercial cleaning jobs are outlined in this illustrated bulletin. A table shows approximate savings in sweeping costs achieved. Wilshire Power Sweeper Co.

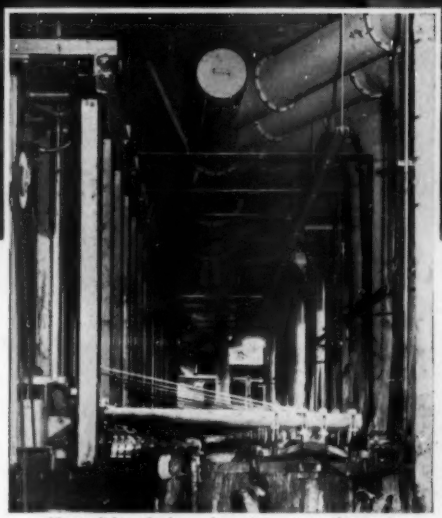
(More Bulletins on page 167)



Joy fans are installed in the ducts for greater efficiency, easier installation, and economy of floor space.

PLATING LINE VENTED BY JOY AXIVANE® FANS

Corrosive Air Removed in Jig-time By "In-the-Duct" Installation of Exhaust Fans



Vertical branch ducts draw fumes into the trunk line for ultimate discharge into the atmosphere.

An interesting, and necessary, feature of the new zinc and cadmium plating line at Appleton Electric Company, Chicago, is the compactness of the Joy Axivane Fan exhaust system.

This exhaust system carries off the hot, corrosive air from the plating line up to the roof where it is discharged into the atmosphere.

Centrifugal units would have necessitated an expensive modification in the building structure, in addition to a larger, more complicated duct system.

The compact, in-line design of the Joy Axivane Fans permitted installation *right in the ducts* on the floor above the plating line. Floor space was saved, installation costs were drastically reduced, building structure did not have to be altered, and a much smaller and simpler duct system was constructed!

Joy Axivane Fans will show you new standards in efficiency, compactness, quietness, and outstanding versatility. There are 136 models . . . all with adjustable blades . . . for volumes up to 300,000 CFM and pressures to 11″ wg. Get the full story on Joy Fans by writing for Bulletin J-611, TODAY. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer, or
WRITE FOR THIS BOOKLET #J-611

WAD 1 5378

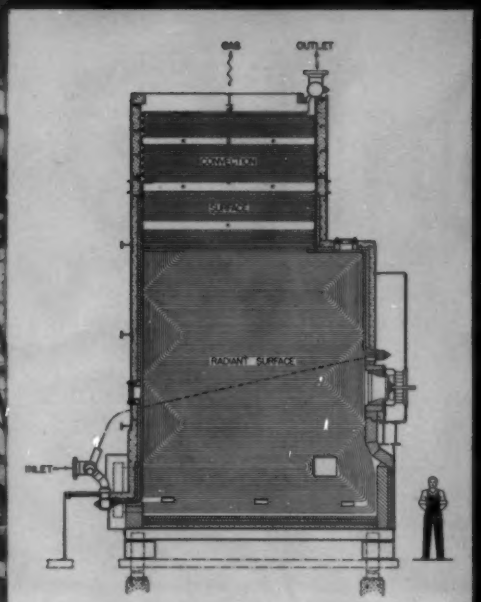
JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

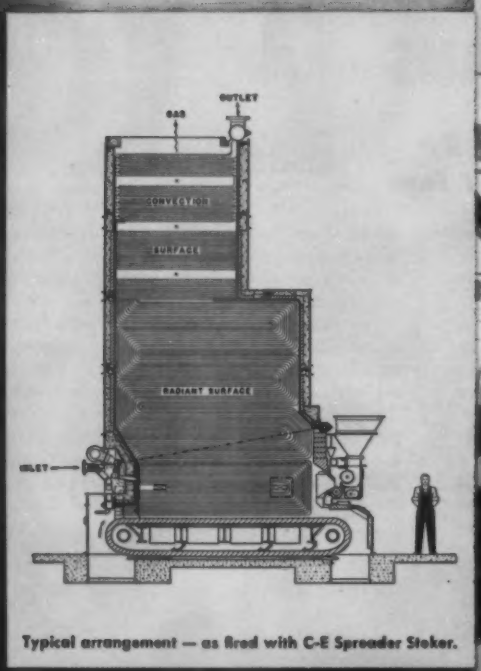
For more facts circle 517 on Reply Card

C-E LaMont Controlled Circulation Hot Water Boilers

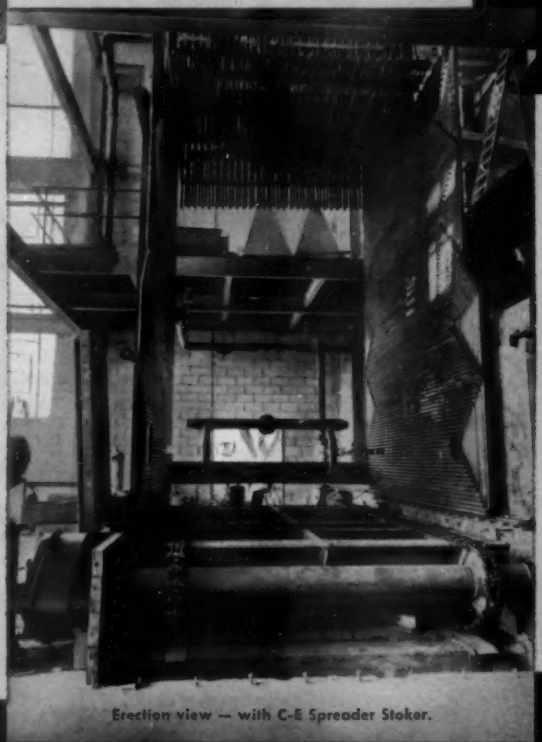
Installation view — oil fired unit.



Typical arrangement — as fired with oil or gas.



Typical arrangement — as fired with C-E Spreader Stoker.



Erection view — with C-E Spreader Stoker.

Ever consider High Temperature Water for your heating and processing needs?

Both steam and high temperature water have their place, and your particular requirements will determine which is best for you. In either case the complete C-E line includes a type and size of boiler exactly suited to your requirements. Where high temperature (HT) water seems indicated, it affords such important advantages as:

1. The higher available heat in HT water . . . many times that of steam at the same pressure.
2. Closer control of temperatures throughout the system.
3. Heat loss is minor with the HT water closed system . . . no condensate losses . . . unused heat returns to the boiler.
4. No elaborate feedwater treatment required because make-up requirements are small.
5. No steam traps are needed, which means elimination of all trap problems and attendant expense.
6. No blowdown losses . . . no safety valve vent losses . . . no condensate return lines.

The planning of any new heating and/or processing system should give proper consideration to the suitability of the HT water system. There are many hundreds of HT water installations operating abroad and a rapidly growing number in the U.S.A. It may be *just right* for *your* requirements.

B-831

Advantages of the C-E Hot Water Boiler

Once it is established that HT water is right for your needs, your next concern is selection of proper equipment. The C-E LaMont Controlled Circulation Hot Water Boiler has inherent advantages that make it the best possible choice. It is especially designed for HT water applications utilizing as it does the principle of forced, controlled circulation which is extended throughout the entire system. This accounts for numerous points of superiority in the C-E LaMont Hot Water Boiler. Among these are:

1. Complete control over HT water movement in both system and boiler.
2. Low pressure loss is inherent so no separate boiler pump is required.
3. Pressurized operation with oil or gas means no induced draft fan — simple stack.
4. Single-pass design — no baffles . . . low draft loss . . . cleaner boiler.
5. More efficient heating surface can be arranged because of positive, controlled circulation.
6. Other features such as: steel enclosed setting — few headers, all accessible — any fuel, oil, gas or coal.

The C-E Hot Water Boiler is available in sizes ranging from 15 to 200-million Btu per hour, or more, with pressures up to 300 psi and temperatures to about 425 F.

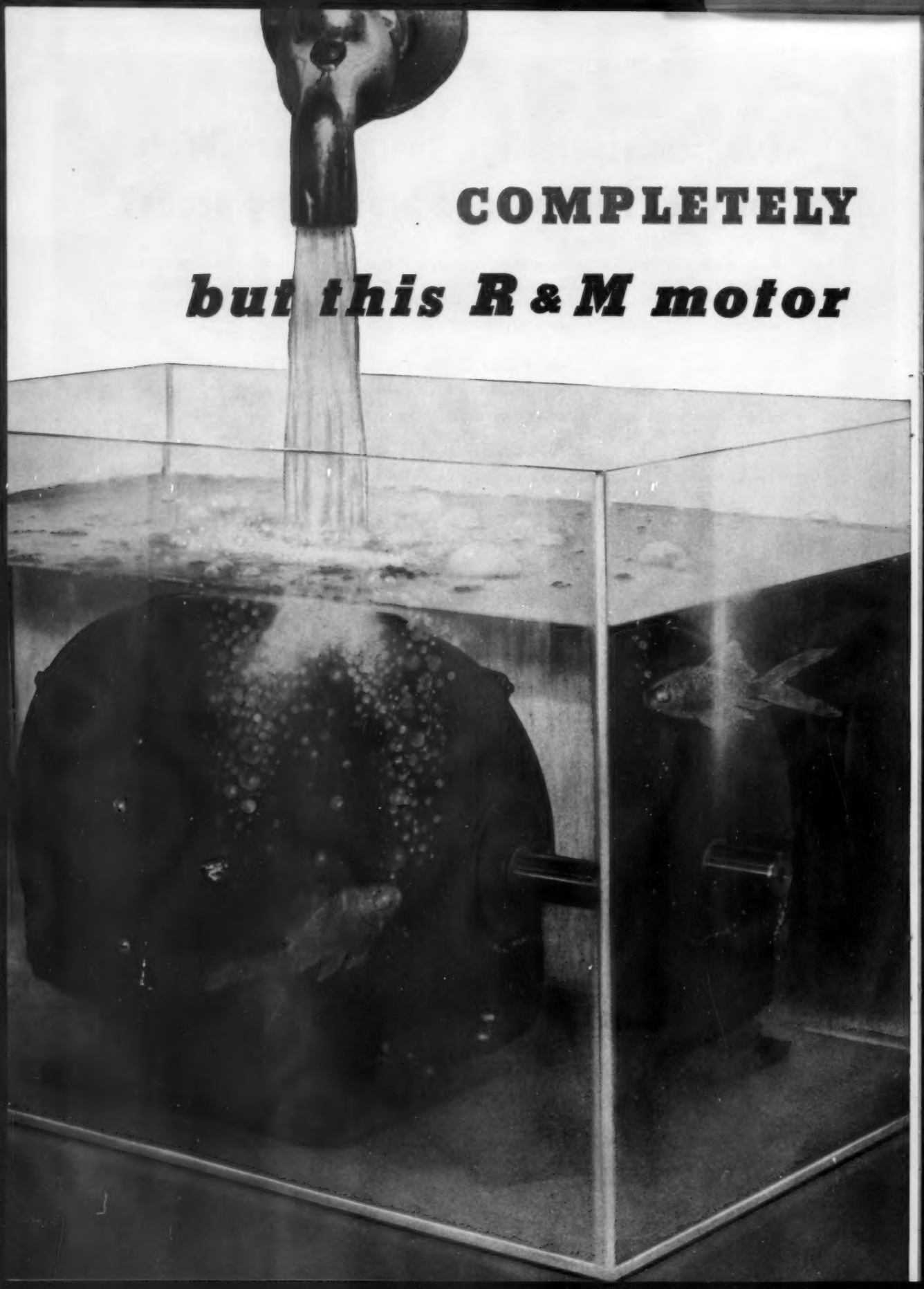
If you are in the market for a heating or process system — or expect to be — by all means investigate high temperature water and the C-E LaMont Hot Water Boiler. Our engineers will be pleased to discuss the subject with you or your consultants. Write for our new catalog HT-127.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

For more facts circle 518 on Reply Card


COMPLETELY
but this R & M motor

COVERED WITH WATER

is still going strong!

R & M's COMPLETE "WEATHERIZING" PROCESS GIVES IT LASTING PROTECTION AGAINST MOISTURE

A recent plant survey showed that one of the principal causes of motor failure is *humidity . . . moisture . . . dampness.* Obviously, this R&M "All-Weather" Motor was subject to more than simple humidity when it was completely "dunked" in a water tank and allowed to run for twenty-four hours. But the test was an *accelerated* version of what happens to motors over a period of months or years.

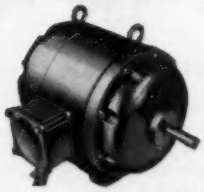
This R&M Motor ran perfectly . . . *under* water, *after* being taken out but still wet . . . and after being dried out! It's an outstanding example of how R&M "Weatherizing" pays off in more trouble-free motor performance.

Just what is "Weatherizing"? It's a process where steel parts are undercoated with a special rust-resisting compound—dipped and then *baked* on; a method of spraying the entire shaft, the rotor and the fan to protect these parts against corrosion; a treatment for all cast-iron parts, as specified by the Armed Forces for motors used in damp or tropical locations; an elaborate system of pre-heating, dipping and baking the entire winding; special sealing of coils.

Here's a motor built with the *extra* care that gives you an *extra* margin of safety . . . available at a *standard* motor price!

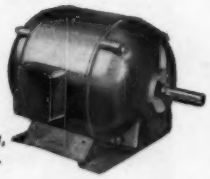
from 1 to 200 horsepower... R&M®

if it's an **R&M**, *it's the right motor!*

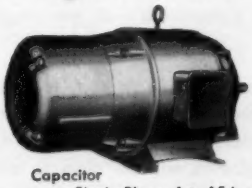


Explosion-Proof, Totally Enclosed Fan-Cooled, 1 to 40 h.p.

Frequency Converters, 2½ to 15 K.W.



Direct Current, 1 to 7½ h.p.



Capacitor Single Phase, 1 to 15 h.p

ROBBINS & MYERS, INC.

"All-Weather" is a Robbins & Myers trademark.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

Mail the coupon TODAY! **Get more information on the finest motor your money can buy!**

Robbins & Myers, Inc., Springfield 99, Ohio PE

☐ Please send illustrated Integral Motor Catalog, showing all the extra features of R&M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

- ☐ Explosion-Proof Motors
- ☐ Capacitor Single-Phase Motors
- ☐ Totally Enclosed Fan-Cooled Motors
- ☐ Frequency Converters

Name.....

Title.....

Company.....

Address.....

City.....*Zone*....*State*...

Chempro's new Style FM-4 bearings, bushings, washers, etc., have given remarkable service in pumps, mixers and reactors operating under highly corrosive conditions. Made of Teflon,* glass, graphite and an inert lubricant, Style FM-4 bearings and bushings are hard, corrosive-resistant, have a low coefficient of friction, and compare favorably in wearability with those made of metal.

FOR EXAMPLE:

If other bearing materials on your pumps have failed due to corrosion...use **FM-4.**

If the shaft bearings on your mixers and reactors must be compatible with the product ...use **FM-4.**

Also available in rod, tube and cylindrical shapes in a wide range of sizes and wall thicknesses. Our engineers will be glad to assist you in developing the product to meet your specific needs.

Write for Bulletin CP554.

THE ORIGINAL FABRICATORS OF TEFLON PACKINGS AND GASKETS

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N.Y.

For more facts circle 520 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Article Reprint in Japanese

PLANT ENGINEERING:

"We have with the greatest interest read a series of articles in your magazine, from March to July, 1948, named 'The How and Why of Steam Trapping,' by H. G. Ebert. These articles are about steam trapping and are written by one of the Yarnall-Waring engineers.

"Our company is manufacturing Yarway impulse steam traps in Japan according to a license manufacturing agreement with the Yarnall-Waring Co. of Philadelphia, and we shall very much appreciate your permission to publish the above articles in one of the Japanese magazines, of course, stating that this is a reproduction of PLANT ENGINEERING." *K. S. Gadelius, Managing Director, Gadelius & Co., Ltd., SKF Building, 7 Shiba Park, Tokyo, Japan.*

▶ Business publications are always happy to know that material which has been published in their books retains its basic value for years after it originally appeared. You can, therefore, imagine how pleased we were to receive your letter requesting permission to reprint this series of articles. You certainly have our permission and, if possible, we would appreciate receiving copies of the issues in which this series will appear.—*Editors.*

Sample, Specifications and Cost

PLANT ENGINEERING:

"May we obtain further information on the Pittsburgh Corning Duraface Foamglas which was mentioned in the March, 1955, issue of PLANT ENGINEERING.

"We are interested in a sample, specifications and approximate cost data." *R. W. Hastings, Chief Engineer, Shawinigan Resins Corp., Springfield, Mass.*

▶ Your inquiry has been forwarded to Mr. Thomas P. Nee, Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pennsylvania, who will see that a sample of Duraface and additional information are sent to you.—*Editors.*

Name of Pump Manufacturer

PLANT ENGINEERING:

"It has been noted in your April, 1955, issue under article entitled 'Pump Tackles Tough Job at I-T-E' that a ½ hp Chempump was installed at I-T-E Circuit Breaker Co. for handling trichlorethylene, which pumped satisfactorily with no maintenance involved after 3,000 hours.

"Inasmuch as this installation handles corrosive liquids, it would be appreciated if the name of the manufacturer of the pump would be furnished this office in order that information may be obtained to determine the feasibility of utilizing a similar pump at this installation." *Benjamin B. Crawford, Captain, CE, Chief, Engineering and Svc Division, Chemical Corps, Headquarters Pine Bluff Arsenal, Arsenal, Arkansas.*

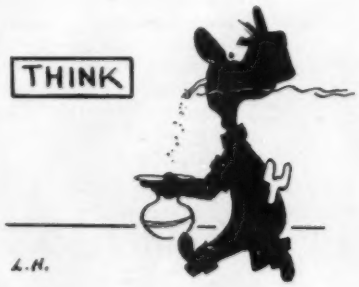
▶ This pump is manufactured by the Chempump Corp., 1300 East Mermaid Lane, Philadelphia 18, Pa., and we have taken the liberty of notifying Mr. William W. Drake of your interest in additional information.—*Editors.*

Tape Booklet

PLANT ENGINEERING:

"We would appreciate receiving a copy of the booklet 'Application of Pressure-Sensitive Tapes for the Metalworking Industry,' which was illustrated in the April, 1955 issue of PLANT ENGINEERING." *F. P. Adams, Plant Engineer, Wolverine Tube, Detroit, Michigan.*

▶ Your request is being forwarded to Gene K. Jordan, Product News, Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul, Minnesota, who will send the booklet to you.—*Editors.*



Liked Review of Book

PLANT ENGINEERING:

"Thank you very much for your favorable review on my book *Inside Industry* which appeared in the April, 1955 issue of PLANT ENGINEERING.

"The emphasis you placed on the human element and its importance to our economic strength was very gratifying to me, as it indicated that you read the book.

"The realistic review policy practiced by your magazine gives significance to its comments and opinions.

"This author, and I'm sure others as well, greatly appreciate this refreshing approach." *Ray Smith, Chicago, Illinois.*

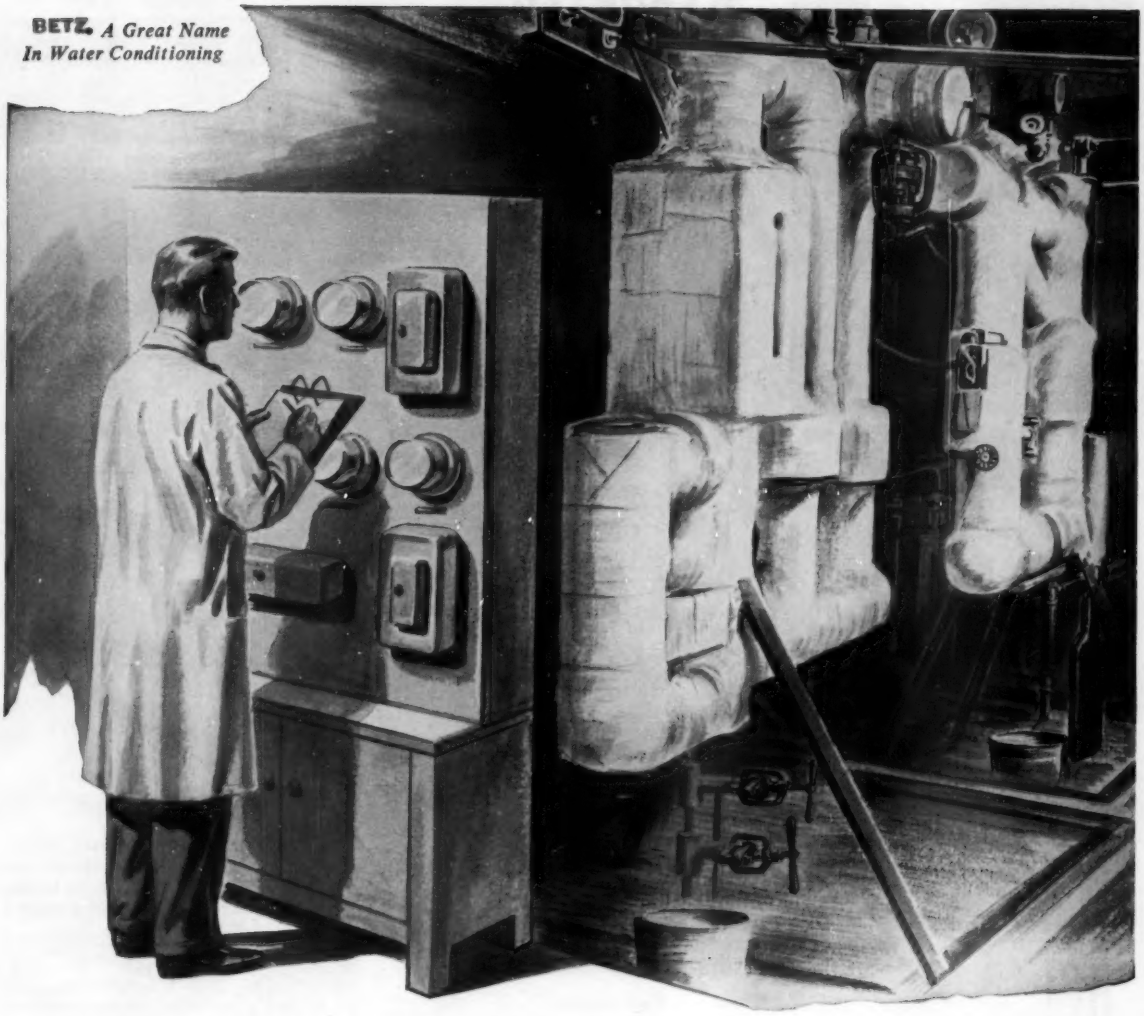
Tan Paint Covers Old Markings

PLANT ENGINEERING:

"We noted with interest in your April, 1955, issue in the Plant Engineers' Digest section an article on reusing corrugated cartons. It was from a release of Luminall Paints, Chicago, Illinois.

"Inasmuch as there was no street address to whom our inquiry could be di-

BETZ *A Great Name In Water Conditioning*



Proving ground for an idea

Many of today's industry-accepted water conditioning techniques were unknown just a few short years ago. Yet they were made possible by the extensive research which is carried on daily at our headquarter laboratories in Philadelphia.

Little wonder then, that we consider our *continuing* program of research and development so important.

The testing and retesting of new chemical compounds and formulations—*under actual plant conditions* in complex "Tom Thumb" equipment like this—is only a small part of our research program conducted to assure better water conditioning for industry.

As a result, advanced Betz discoveries, tested in the laboratory and *job-proved* in the field, have vastly increased operating efficiency and economy in industrial plants, petroleum installations, and institutions—everywhere.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 521 on Reply Card

REEVES

Vari-Speed

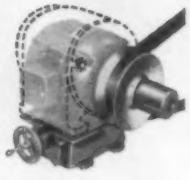
Motor Pulleys

Completely new design

½ to 15 hp

Smaller Units! More HP!

"Spiral-groove" Lubrication



For New or Old NEMA Motors

CHECK ALL THESE NEW REEVES FEATURES!

1. New, smaller disc assemblies—engineered for new or old NEMA Motors.
2. New spiral-groove lubrication for rust-free, trouble-free service.
3. One-point lubrication when unit is stopped *or in operation.*
4. Superior base construction for greater rigidity and strength, reduced vibration and noise.

Write today for complete details. Specify Dept. PE12a.

REEVES PULLEY COMPANY

COLUMBUS, INDIANA

Division of Reliance Electric and Engineering Co.

For more facts circle 522 on Reply Card

BACKTALK

rected, we wonder if you would be kind enough to forward this to them.

"We are interested in receiving a sample together with price and delivery information." *Robert J. Gordon, Works Manager, Eastern Metal Products Corp., Tuckahoe, New York.*

▶ We have notified the manufacturer, Luminall Paints, Div. of National Chemical & Mfg. Co., 3617 S. May Street, Chicago, Illinois, of your interest in obtaining additional information.—*Editors.*

Tapes, Flexidyne, Etc.

PLANT ENGINEERING:

"In the April issue of your magazine, there are two articles which are particularly interesting and on which I would appreciate receiving additional information.

"These are: 'How and Where to Use Tapes,' appearing on page 118 and 'Flexidyne—The Dry Fluid Drive,' appearing on page 120.

"In addition, I would like to have a copy of the booklet on 'Productive Maintenance' offered in Item 376 in your Data File in this same issue." *R. L. Reid, Plant Engineer, General Motors Diesels, Ltd., London, Ontario, Canada.*

▶ Additional information on Flexidyne will be sent to you from the Dodge Manufacturing Co. We are also notifying the manufacturers of your interest in receiving the booklets on Pressure-Sensitive Tapes and Productive Maintenance—*Editors.*

Dye Reveals Cracks in Metal

PLANT ENGINEERING:

"Would you please advise where we might obtain further information on the Dy-Chek system mentioned on page 128 of the March, 1955, issue of your magazine." *J. S. Price, Supervisor of Development Department, Revere Copper and Brass, Inc., Baltimore, Maryland.*

▶ We have notified the Turco Products Corp., 6137 South Central Avenue, Los Angeles 1, California, of your interest in getting more information on this method of testing equipment. You might also be interested in a previous article we had on this subject. It appeared in our March, 1951 issue, page 70.—*Editors.*

Ultrasonics Guards Property

PLANT ENGINEERING:

"In your May, 1955 issue of PLANT ENGINEERING you have an article titled 'Here Is What Ultrasonics Can Do,' by Paul W. Eberhardt, which I have found very interesting.

"Under the sub-heading of Industrial Uses, the first sentence states that ultrasonics can be used to protect property against theft. Could you please forward the names and addresses of any companies or distributors that handle these units." *J. E. Daehling, Plant Engineer. Bendix Aviation Corp., Eatontown, N. J.*

▶ The author of this article will be able to give you more information about these units. Address inquiry to Walter Kidde & Co., Inc., 260 Madison Ave., New York 16, N. Y. In addition, you may wish to contact several other possible manufacturers: Alertronic Protective Corp. of America, 43-18 Van Dam St., Long Island City, New York and Phone Craft Co., 427 N. Euclid Avenue, Vandeventer and Olive, St. Louis, Missouri.—*Editors.*

Copies of Sling Chain Articles

PLANT ENGINEERING:

"On page 96 of your May, 1955 issue you feature an article entitled 'When Specifying Sling Chains.'

"We would greatly appreciate receiving 30 reprints of this article. If you do not anticipate printing reprints, we would appreciate knowing if we could purchase 30 copies of this issue.

"May we extend our congratulations on a very excellent article." *N. Allan Pattit, Advertising Manager, Campbell Chain Co., York, Pennsylvania.*

▶ We have done our best to get together as many tear sheets as possible of this article but have been able to come up with only fifteen. Inasmuch as no reprints were made, it is necessary to send you fifteen complete copies of the magazine to make up the 30 copies you requested.—*Editors.*

Query on Metal "Eraser"

PLANT ENGINEERING:

"On page 56 of the May issue of PLANT ENGINEERING there was a picture captioned 'Ball Bearing "Eraser" Cleans Scratches in Aluminum Sheet.'

"We would like a little more information as to revolutions per minute and vendor of attachment." *D. J. Haack, Project Engineer, H. H. Robertson Co., Ambridge, Pennsylvania.*

▶ We should like to suggest that you get in touch with Mr. Joe Rowland, Manager of Information Services, Martin Aircraft Co., Baltimore, Maryland, who will be able to supply you with this additional information.—*Editors.*

Seven years service for STANOIL Industrial Oil at David Bradley Mfg. Works —No down time for lubrication

L. R. Cummings (left), Standard lubrication specialist, inspects sample of STANOIL, with Robert C. Menken, Plant Engineer of David Bradley Manufacturing Works. Larry Cummings has been serving industrial customers for Standard Oil since graduation from Standard's Sales Engineering School. His mechanical engineering degree from Tri-State College of Indiana qualified him for this work. Customers of Larry's find this experience and background pay off for them.

David Bradley Tri-Trac, handy piece of farm equipment gives farmer new opportunity for mechanization at low cost. Upper frame on which gasoline tank is mounted, is part formed in HPM press.

Seven years ago David Bradley Mfg. Works installed 900 gallons of STANOIL Industrial Oil in an HPM press. There's been no down time required for lubrication maintenance since. A pump by-pass screen filter is the only filtering the oil receives, yet the system continues clean. In March, 1954, an analysis of the oil showed:

Viscosity @ 100° F.	— 980
Color, NPA	— 6
Neutralization No.	— .11

STANOIL Industrial Oil has long been at work for Bradley. Successful operations with it in other equipment caused Bradley engineers to specify STANOIL for this installation.

The HPM double acting, fast traverse hydraulic press reported on here is used to draw the upper frames for the David Bradley Tri-Trac, compact farm tractor. The Tri-Trac is the newest implement in the Bradley line. Bradley has been making farm implements since 1832.

Like to know more about STANOIL? Perhaps it can serve you as efficiently as it is serving David Bradley. Lubrication specialists in any Standard Oil office will be happy to help. In the midwest, a call to one of them will bring a prompt response. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY
(Indiana)

For more facts circle 523 on Reply Card

JAL-TREAD FLOORPLATE
THE SHORTEST DISTANCE BETWEEN

J&L STEEL

The straight-line pattern of J&L Jal-Tread raised cleats plus the strength and toughness of high quality steel combine to provide floor plate with both safety and economy.

Whatever your application . . . in new construction, new equipment or replacement, you'll find Jal-Tread offers you the shortest way to:

Safe Footing—300 miniature squares per square foot—all of uniform height—provide maximum linear friction surface, protect against lost-time accidents.

Easy Fabrication—The Jal-Tread straight line pattern simplifies welding, flanging, shearing, bending, punching, and drilling operations. Experience shows that Jal-Tread can be cold-formed on standard plate-bending machines.

Easy Cleaning—The Jal-Tread straight line gutter pattern permits quick, thorough sweeping and draining in any direction.

For safe, long-lasting flooring always specify J&L Jal-Tread . . . *it's available at leading distributors everywhere.*

see our catalog in Sweet's ARCHITECTURAL FILE or write for copy

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

For more facts circle 524 on Reply Card

For more facts circle 525 on Reply Card ⟶

Problem:

How would you protect this key motor?

STOCK A COMPLETE MOTOR?	STOCK A COMPLETE ARMATURE?	STOCK ARMATURE COILS?	STOCK NO CRITICAL PARTS?
☐	☐	☐	☐

TURN PAGE AND SEE G.E.'S Productive Maintenance ANSWER ➤

GENERAL ELECTRIC

HERE IS A TYPICAL PARTS PROTECTION ANALYSIS

(This evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation. $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

X Add disassembly, assembly and transportation time to actual time.

* Add repair cost, on straight time basis, of failed unit.

THIS IS AN EXAMPLE—taken from an actual case history—of how you can carry out Step 4 in General Electric's *Productive* Maintenance plan. To begin with, assume the worst: an armature failure which would require lengthy downtime, at $700 per hour. The motor involved is a 500-hp slow speed d-c motor on a machine critical to production. When all figures are added, it is evident that stocking of a complete armature is the most economical protection for this specific motor. Your G-E representative can help you make the right decision about better protection for each of your critical drives.

THIS EXAMPLE SHOWS YOU HOW...

Productive Maintenance

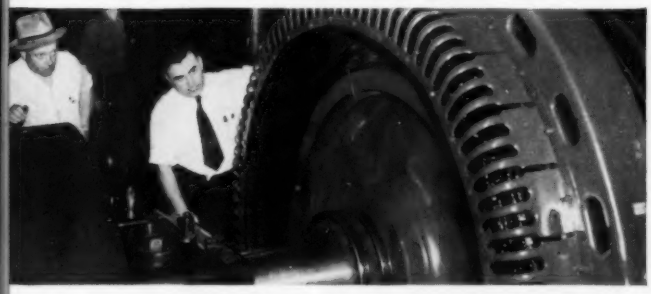
The problem of keeping your key electrical equipment in operation isn't a simple one these days when the equipment and the production lines are becoming more and more complex. To solve the problem, you must bring to bear more maintenance know-how and specialized skills than ever before. More and more, the responsibility for increasing production—through more effective maintenance—rests on your shoulders.

This *Productive Maintenance* 5-step plan can make your maintenance budget more effective...

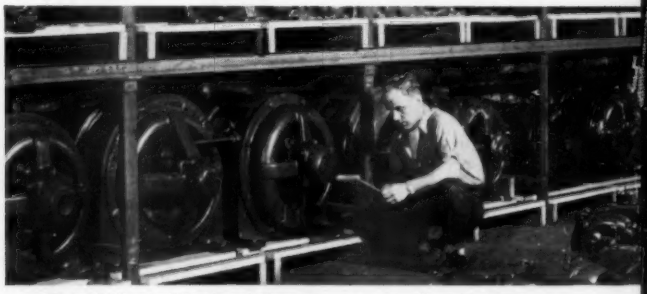
1. Gather complete equipment data. A record system of this inventory is a basic part of your program.

2. Determine amount of routine maintenance necessary for your system. Your G-E representative will help.

3. Put your record system to work. Set up inspection cycles, work orders and systematized stocks.



4. Inspect and evaluate all equipment vital to production. This data will help you determine the parts protection needed for each key item of electrical equipment.



5. Establish a critical maintenance program by stocking parts on a planned basis and scheduling overhauls well ahead of the actual maintenance date.

CUTS TOTAL COST OF BREAKDOWNS

General Electric's five-step *Productive* Maintenance plan can help you meet this responsibility. This plan is essentially an application of men, materials, and tools. (See 5 steps at top of page) By organizing this idea into simple steps, you can get more effective maintenance, more production from each machine and a smoother work flow.

Your General Electric Service Shop or renewal parts representative can give you the complete *Productive* Maintenance story. Ask him to arrange a showing of the G-E sound-color film on *Productive* Maintenance and to give you specific help and suggestions in setting up your own program. Or, fill in the convenient coupon on the next page and ask for General Electric brochure, "5 Steps to *Productive* Maintenance."

GENERAL ELECTRIC

TURN PAGE FOR PRACTICAL HELP

Call in a G-E representative for help in starting your own *Productive Maintenance* program

TRAINED ASSISTANCE in planning overhaul schedules (step 5) is yours for the asking. Your G-E Service Shop representative is a specialist who will work with you in setting up each step in a ***Productive*** Maintenance program specifically designed for your own plant.

COMPLETE PARTS DATA is essential. G-E Renewal Parts specialists can help you tailor a renewal parts program for your plant, and also guide you in establishing your parts inventory system (steps 4 and 5). Take advantage of this expert help.

Plan your overhauls this way: Systematically remove from operation the equipment that needs overhauling most. Do this at the most favorable time from your production standpoint. These planned, short-term outages take far less time and expense than unplanned shutdowns. Your G-E Service Shop representative can help assess your equipment's condition, and utilize G-E Service Shop facilities to make your *Productive* Maintenance program fully effective.

When setting up your *Productive* Maintenance program, steps 4 and 5 are most important. It will pay you to ask G-E maintenance experts for guidance in organizing your renewal parts budget so every dollar gives the most protection possible. This will help your maintenance become productive faster. Most parts are carried by a nation-wide network of strategically located G-E warehouses, as well as distributors in your area.

Productive Maintenance — as vital as production itself!

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
APPARATUS SALES DIVISION, SECTION 801-16
SCHENECTADY 5, NEW YORK

- ☐ Please send me the detailed manual "5 Steps to *Productive* Maintenance" (GEA-6087).
- ☐ Please have a G-E representative call on me.
- ☐ I'd like to arrange a showing of the 25-minute sound-color movie, "*Productive* Maintenance."

NAME_____ POSITION_____

COMPANY_____

CITY_____ STATE_____

ease your hydraulic equipment maintenance problems with GULF HARMONY OIL

Use a hydraulic oil that has excellent resistance to oxidation, high film strength, outstanding rust preventive and anti-foam properties—qualities which hydraulic engineers consider to be the most important when selecting a hydraulic lubricant —and you will have fewer maintenance problems and less down time.

Gulf Harmony Oil has all of these qualities. It prevents the formation of sludge deposits and maintains its original viscosity over long periods of time. It also protects hydraulic equipment against excessive wear, even under severe conditions of pressure, speed, and temperature. And it protects against the damaging effects of harmful rust.

So if you have maintenance problems with your hydraulic equipment, call in a Gulf Sales Engineer. He will recommend the right grade of trouble-preventing Gulf Harmony Oil for your equipment. Contact him today at your nearest Gulf office.

GULF OIL CORPORATION
1822 Gulf Building

GULF

GULF REFINING COMPANY
Pittsburgh 30, Pa.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

For more facts circle 526 on Reply Card

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by M. E. Weissman

Gamma Rays Measure Density of Liquids

DENSITY OF cement and asbestos fiber slurry used in the manufacture of asbestos sheet, can be measured by a density gammagage in much the same way that other isotope gages measure sheet materials.

The density gage, developed about a year ago, employs gamma radiation from a cobalt 60 source to probe through tank or pipe walls and determine the density of the fluid inside.

The detector unit is an ionization chamber, 4 in. long by 2½ in. diam, filled with an inert gas, argon, at 200 psi pressure. The electrical signal from the detection chamber is transmitted through a low impedance cable to the control cabinet. Here, the signal is balanced against the signal from a second, internal source-detector combination.

The balancing source is thallium 204. The signal it emits to the internal source is balanced against the signal from the outside detector when the instrument is set to read at zero.

Since the vat which contains the slurry and the cylinders on which the asbestos sheet is formed, is 15 ft wide, it was not practical to locate the source and detection heads of the gage on opposite sides of the tank. The amount of radiation spanning such a distance would be too small to give highly accurate measurements. Instead, the cobalt source was inserted in one of two agitators mounted on shafts inserted through the sides of the vat.

(Continued on page 40)

Digital Computors Bring Automation to British Plants

AUTOMATIC PLANTS and offices, controlled by electronic computers or "brains," are rapidly approaching reality in Britain.

In the plant, engineers are devising systems for using electronic brains to control a score or more "auto-transfer machines," each one of which will automatically perform many different machining operations, one after another.

The automatic factory is dependent on an electronic "brain," such as the digital computer, which can take the place of the watching foreman at the control panels where the records of the measurements and actions of these lesser machines are continuously written down. Such computers have memories for storing large numbers of facts and instructions, each one of which they can consult within 1/800th sec or less.

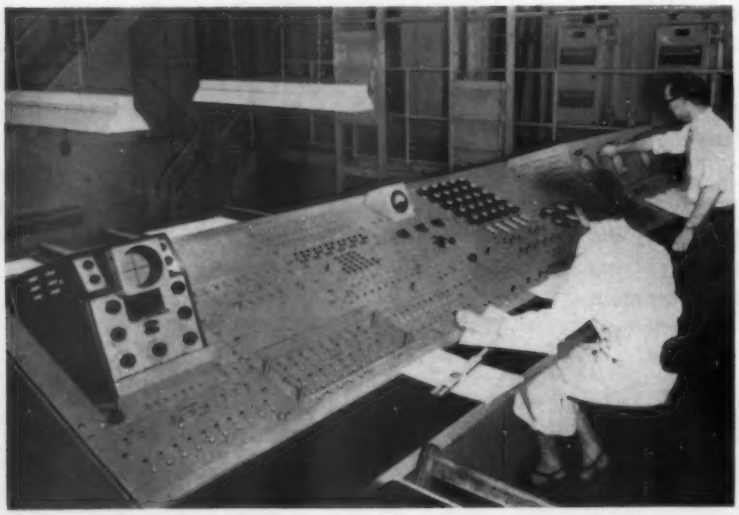
From one to 10,000 valves control the actions of each part of these computers and undertake the actual counting. The counting valves are arranged in pairs since the computer counts in units of twos. By alternately switching "on" or "off," each unit is added, subtracted, multiplied or divided.

In the world's first commercial system for a fully automatic factory, developed by the electrical firm of Ferranti, an electronic brain will simultaneously control every individual movement of as many as 50 different lathes, boring machines, and drilling machines. Here the controlling electronic brain will be free to change the pattern of movement of the different cutting tools so that each tool can be used to make a variety of complex-shaped components.

Prototypes of these computers will be in operation this year. With them it will be possible to make changes in the design of components, or to introduce new components without having to re-equip the plant with new machines, as would be the case today. With an initial expenditure of $70,000 to $112,000, as much as 20 to 30 per cent of the cost of each item made may be saved in cases where only 100 copies of each component are made.

In the Ferranti system, the measurements on the designers' drawings of the new component are fed into the computer in the form of a punched paper tape made by a machine resembling a typewriter. The progress of the work on each machine controlled by the computer is measured many times each second by photo-electric cells. These cells record the changes in the pattern of a light caused by the movement of two intervening, minutely ridged, transparent gratings attached to the machine. Yet, although the computer receives several thousands of electrical pulses from the photo-electric cells on each machine it is controlling, no slave machine is permitted to continue with the next movement in shaping the part until it has received a command signal from the computer. Parts are unfailingly shaped to an accuracy of within 0.005 in.

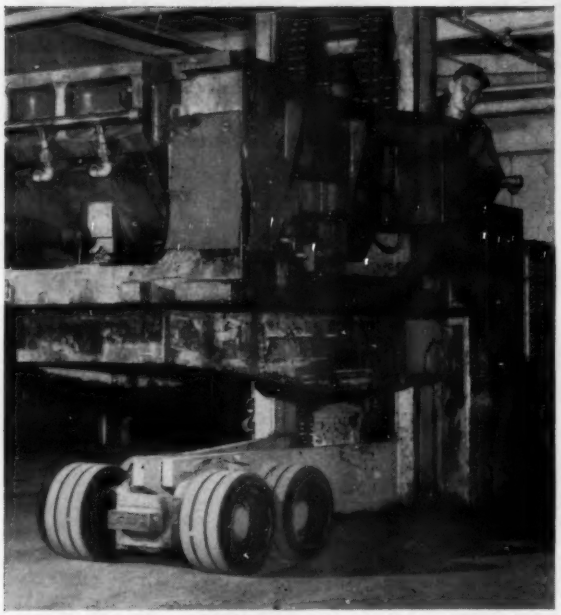
Two immediate results of the introduction of the automatic plant can be foreseen. Firstly, the workers in plants will have far more productive energy at their disposal and secondly, a far larger amount of data concerning actual manufacturing processes will be made available than previously. *From an article by D. W. Morley, London.*



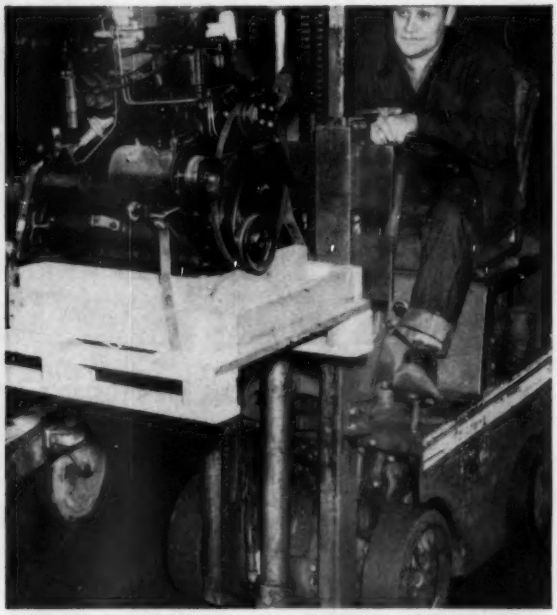
Control board of computor which aids in the design of electronic equipment

B.F.Goodrich

TW ANALYSIS lengthens tire service, cuts costs for Willys Motors



Major Mechanic Harold Roberts operates a lift truck carrying a 7-ton Willys door die to the press.



This Willys truck motor heads for the shipping department, driver James Boltz at the wheel. Willys uses nearly 10,000 industrial tires.

OVER 2,000 materials handling units carry dies, motors, parts and the like throughout the vast Willys Motors plant in Toledo, Ohio. Oil and grease attack the industrial tires, railroad tracks bruise them, steel shavings tear at them. Virtually every existing threat to tire life can be found in the Willys complex materials handling set-up.

That's why the company turned to the B. F. Goodrich Tire and Wheel Analysis man. He studied Willys' operations, recommended the right tire types, sizes, tread designs and tread compounds for each of their varied jobs. The result, says Major Mechanic Harold Roberts, is that "these industrial tires give us far longer, trouble-free service—and this saves us money."

Find out how the FREE TW Analysis can save you money

No matter what your materials handling problems are, you can benefit from a FREE B. F. Goodrich Tire and Wheel Analysis. Just call your local B. F. Goodrich retailer or mail the coupon. The TW man will survey your equipment, loads and hauling surfaces. The tire and maintenance recommendations he makes will be *unbiased*, because B. F. Goodrich makes a *complete* line of industrial tires. Act now—let your B. F. Goodrich man show you how to start saving. He may cut your tire costs as much as 50%. A special TW Analysis Plan is available for manufacturers of industrial equipment.

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-513, Akron 18, Ohio

Please send me:

- ☐ Additional information on your Tire and Wheel Analysis Plan
- ☐ Free copy of "Industrial Tire Guidebook"
- ☐ Free copy of "How to Get Extra Service out of Solid Industrial Tires"

Name_____

Company_____

Street_____

City_____ Zone____ State_____

For more facts circle 527 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

The liquid in the tank provides adequate shielding from the gamma rays, but when the tank is emptied for maintenance, the source is retracted into a lead brick of 3-in. diam, located in the agitator shaft.

To determine the density of the slurry, the gamma rays are directed through a ½-in. steel wall and 11 in. of slurry.

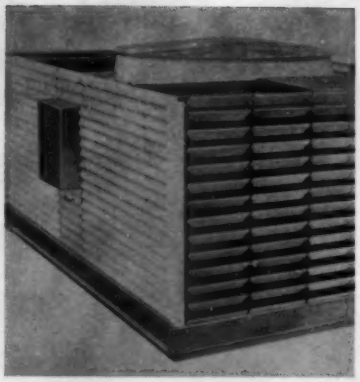
The solids content of the slurry averages eight per cent, and use of the gage allows this percentage to be maintained between seven and nine. Prior to installation of the gammagage, considerably wider fluctuations occurred. It was found that the percentage of solids followed a regular cycle, depending upon whether the hopper supplying the solid feed was full or nearly empty. The gage also showed that a faster machine speed was possible without deterioration in quality.

The machine making the asbestos sheets will soon be made fully automatic with the density gage regulating operation on the basis of a three-point measurement. *From Canadian Isotope Newsletter, published by Isotope Products Ltd., Oakville, Ontario.*

Asbestos for Cooling Towers

WITH THE RECENT introduction of more stringent fire codes and regulations in many cities, it became necessary to use a less flammable material than the specially treated wood used in the construction of cooling towers, for industrial air conditioning equipment.

The engineering department of the Marley Company, Kansas City, following a suggestion by our company, tested corrugated asbestos as a construction material in cooling towers.



Asbestos cooling tower was developed to comply with increasingly rigid fire codes; has passed tests successfully

Towers made of this material passed all fire safety tests. High humidity and

(Continued on page 42)

Laminated Wood Beam Undergoes Fire-Resistance Test

IN A TEST at our plant to demonstrate the fire-resistive qualities of wood, a glulam beam, 9 in. wide by 27⅝ in. long, was subjected to an open flame.

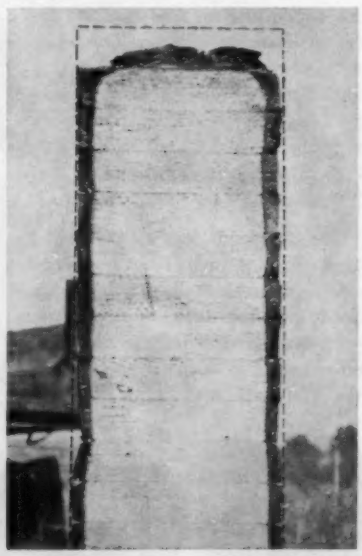
During the hour-long test, temperatures were checked with a pyrometer at regular intervals. Along the sides of the beam the temperature was 500 F at the beginning of the test, increasing to 1600 F maximum. Average temperature during the exposure was 1270 F.

After the beam was removed from the fire, it was cut in the center, at the point where the flame was hottest. Charring along the sides of the beam was even, and there was no trace of delamination due to penetration of the fire. The lamination at the bottom of the beam was charred almost completely through, but did not drop off. Average temperature at the bottom lamination was considerably higher than at the sides of the beam. The uncharred section of the beam equalled 75.8 per cent of original section.

Based on the ultimate strength of the material, the beam would be capable of continuing in service with a safety factor greater than two to one.

In comparison, steel begins to soften at a temperature between 600 F and 700 F, and becomes plastic at a temperature between 1000 F and 1200 F. At 1000 F, the lateral expansion of a steel member may be 9½ in. for each 100 ft of length. During a fire, supporting walls frequently collapse or are badly damaged. Timber, unlike steel does not expand laterally; thus does not push out or damage walls. *From Tim-Press, published by Timber Structures, Inc., Portland, Ore.*

Beam is tested in flame for fire resistance. Temperature on sides reached 1600F



Dotted line shows original size of beam

new WIDER VISION

for easier remote boiler water level readings

■ Vastly improved visibility of remote boiler water level readings can now be enjoyed by boiler plant operators.

A new "wide vision" face on Yarway Remote Liquid Level Indicators allows reading from the side as well as front of the indicator. Boiler water levels and other liquid levels can be checked from most any position.

Indicating mechanism is operated by the boiler water level itself—assuring instant, accurate readings.

Yarway Indicators are of the manometric type with automatic temperature compensation, as approved for use under the recent A.S.M.E. Boiler Code Committee ruling in Case #1155.

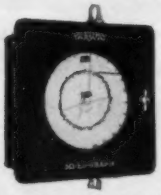
Over 10,000 are used throughout industry for boiler water and other liquid level indication . . . and for superheater pressure differential indication aboard ship.

For full information write for Bulletin WG-1824.

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

A COMPLETE YARWAY SYSTEM

Besides Remote Liquid Level Indicators, Yarway also offers Liquid Level Recorders and Remote Signal Alarms . . . making a complete system for constant, accurate liquid level check.



■ Yarway Hi-Lo-Graph Recorder provides not only water level indication, but also a 24-hour recording of water levels. See Yarway Bulletin WG-1830.

■ Yarway Remote Hi-Lo-Alarm Signals—lights or horns—can be placed at any location in plant. See Yarway Bulletin WG-1824.

YARWAY / ***remote liquid level indicators***

For more facts circle 528 on Reply Card

RCA
..."Headquarters" for Phototubes

INDUSTRY PROVED

RCA—pre-eminent in the design and development of phototubes—offers a comprehensive line of high-quality phototubes to meet your replacement needs in light-actuated devices. The line includes a wide selection of gas types (for sound-on-film and relay work)—vacuum types (for fast response and precision measurements)—and multiplier types (for applications where extremely high sensitivity is important, such as scintillation counting). RCA Phototubes are available in a variety of spectral responses, physical shapes, and sizes—from your RCA Tube Distributor. For tube technical data on RCA Phototubes, write RCA, Commercial Engineering, Section G-34-T, Harrison, N. J.

RCA

RADIO CORPORATION of AMERICA
ELECTRON TUBES — HARRISON, N.J.

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

heat did not affect the material, which is resistant to rot and corrosion under normal conditions. The asbestos is also unaffected by smoke, fumes and industrial gases. Painting and other preservative treatment is unnecessary. *From Old American News, published by the Old American Roofing Mills, Kansas City, Mo.*

Machining Research

DEMONSTRATING that production of jet engine blades could be increased from 700 per eight-hour shift to 2,000 per shift by speeding the root form grinding operation was one successful project of our Manufacturing Research group.

This three-man group was established at the begininng of 1954 as a central laboratory for all our divisions to conduct research on machining and metalworking problems.

The group has four or five projects in various stages of completion, in

Ladd Kabat uses microscope to true up a minute drill. He must see and feel drill simultaneously to adjust it

Magnification shows drill, slightly larger than human hair, ready to drill hole in tube. Object at right is light

For more facts circle 530 on Reply Card →

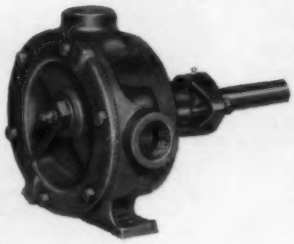
Here's How To

SOLVE YOUR PUMPING PROBLEMS

with

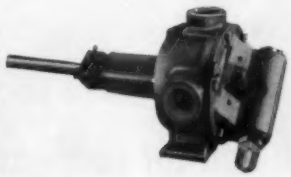
Invader PUMPS

STANDARD SERVICE PUMPS



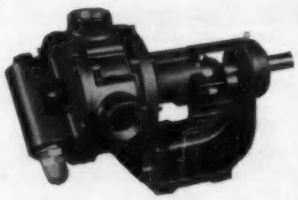
Gear-within-gear rotary pump available in capacities of 5, 10, 18, 20, 30, 35, 50 and 100 gpm. Horizontal port may be on left or right side; also made with straight-through ports. Relief valve optional at extra cost.

HAZARDOUS LIQUID PUMPS



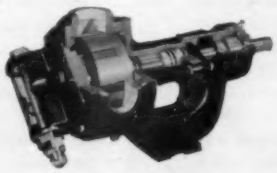
Similar to standard models in appearance and construction. Can be furnished with any type of drive. Complete with relief valve. Listed under reexamination service of UL. Same capacities and port arrangements as standard models.

RUGGED DUTY PUMPS

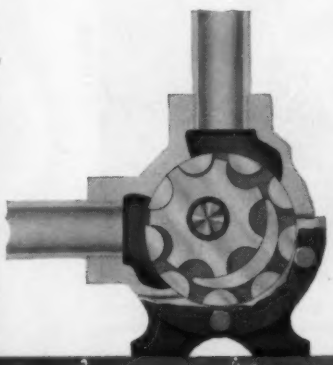


For truck mounting and other installations where operating conditions are unusually severe. Tapped for pipe sizes 1½" to 2"; capacities 35, 50 and 100 gpm. Flange type for pipe size 2½" to 4"; capacities 100, 200 and 300 gpm. Sealed radial thrust bearing keeps out water; end thrust eliminated.

L-P GAS SERVICE PUMP



Double mechanical seal to prevent leakage. Double row radial thrust bearing holds shaft in alignment. Double seal caps protect bearing against wear by keeping out dirt. Relief valve reversible for changing directions of rotation. "O" rings used to assure tight fit . . . prevent leakage. Available in 20, 30 and 55 gpm.



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• These rotary pumps incorporate the positive seal of the gear-within-a-gear principle with a new and improved rolling contact tooth design. Assures less "down-time", fewer replacements and reduced power costs. Self-priming . . . no pulsation . . . economical to operate. You can specify these pumps in any installation or product with the confidence they will give extra service. Write today for catalog "Pumps For All Industries."

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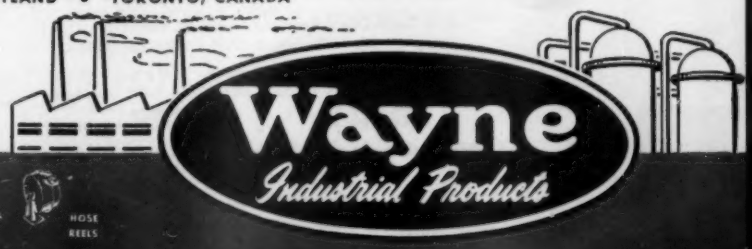

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This FREE Book will cut your gear costs!

When we first offered the BRAD FOOTE Hob List about a year ago the response was tremendous. Thousands of gear designers and engineers recognized in this catalog an opportunity to substantially cut their gear costs. And now, a new revised issue makes possible even greater savings.

The reasons are obvious. Since 1923, BRAD FOOTE has specialized in custom-built as well as production gears. Over the years we have built up a tremendous stock of hobs, cutters and broaches, used in thousands of gear cutting jobs—a stock that enables us to do just about any gear cutting job you may have.

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The Revised BRAD FOOTE Hob List includes all tools prepared through April, 1955. If you have a copy of the Hob List, write for the revised edition. And if you haven't had a Hob List, write for your free copy—find out how it can save you time and money on gears.

IMPORTANT NOTE:
If you now make your own gears, ask for a copy anyway. You may find that it is cheaper for us to make them.

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Phone: Lemont 920
Lemont, Illinois

PITTSBURGH GEAR COMPANY
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Pittsburgh 25, Pennsylvania

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

progress simultaneously. However, only one major project is handled at a time.

Facilities are available for research on the laboratory's own machines and on production machines brought into the laboratory for special purposes. Equipment includes a heavy duty variable speed lathe equipped with a tool force dynamometer; a surface grinder; a horizontal milling machine; and a precision drilling machine.

Ladd Kabat, senior laboratory machinist is responsible for the precision drilling work done in the laboratory. Using spade drills, made of ordinary drill rod, he can drill a hole .001 in. diam, holding tolerances to .0001 in. Most drill sizes range from .003 in. to .033 in.

A .018-in. diam hole drilled in a lubricating nozzle, and requiring a very smooth surface finish, recently unsnarled a production snag in a company division.

Establishment of the laboratory has aided in reducing costs and in substantially improving quality of products. *From Friendly Forum, published by Thompson Products, Inc., Cleveland, Ohio.*

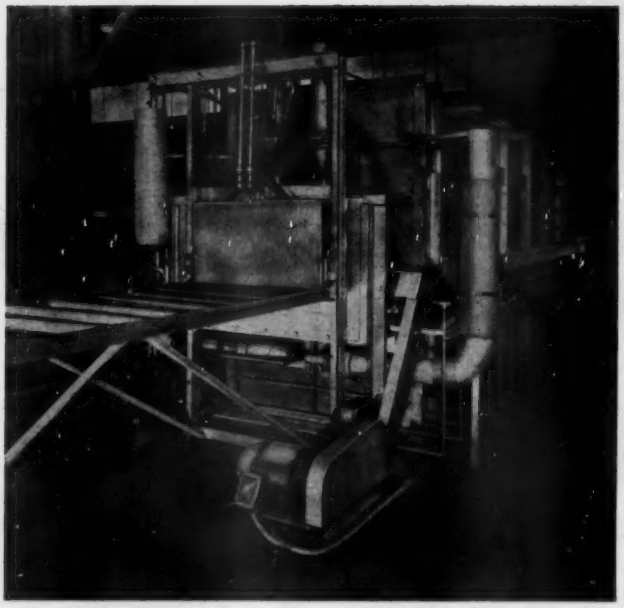
Copper Overhead

COPPER AND ITS alloys have been specified for many purposes in the new Airport Terminal Building at the Lambert-St. Louis Municipal airport, Missouri.

One of these uses is as a roofing material. Sheet copper covers the entire expanse of roof, which consists of three intersecting barrel-vaulted sections with six intersecting dormer arches. Glass skylight sections connect the three units of the roof, each section

Sheet copper is used as a roofing material on barrel-vaulted roof sections

use 'dag' dry films for trouble free lubrication



Here's how a Cleveland foundry proved the value of **'dag'** *dry-film lubrication* in the operation of its continuous core-oven conveyor . . .

A **'dag'** Colloidal Graphite dispersion was used in place of powdered graphite. The lubrication interval of conveyor chain and rollers was extended from *four* days to *sixty* days! In addition to tremendous lubricant and labor savings, conveyor wear has been notably reduced, carbon formation and flake-off eliminated.

This is typical of the extreme-temperature problems solved by 'dag' dispersions . . . problems with kiln cars and hot-strip mills . . . problems with *any* moving parts subjected to temperature extremes . . . problems where solvent action in degreasers or other situations destroys conventional lubricants.

You'll find a surprising number of ways to use **'dag'** dispersions described in our free booklets. Write today for Bulletins No. 426-T6 and No. 435-T6.

Use 'dag' colloidal graphite to stretch maintenance dollars over 1400 percent!

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of carriers.

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Towmotor LP-Gas Trucks offer a new high in performance and efficiency. Users save on fuel, oil and maintenance, because LP-Gas costs less, doesn't dilute crankcase oil and leaves no carbon or gum deposits.

For the highest efficiency in fork lift operation see your nearby Towmotor Representative . . . you'll find a complete line of constant power fork lift trucks for every requirement. Consult your Telephone Directory or write TOWMOTOR CORPORATION, Div. 5807, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG

For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

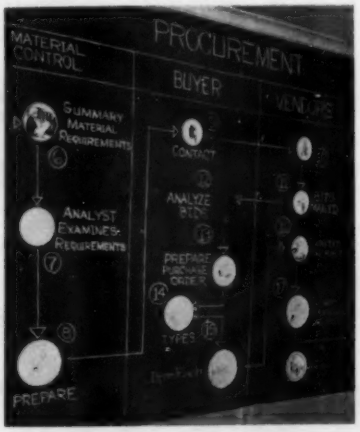
of which rests on four corners, so that no supporting columns are necessary in the main concourse of the terminal.

The roof was constructed as a thin concrete shell over which was built an insulated plywood deck. This was covered with batten seam copper. More than 50,000 sq ft of 20 oz cold rolled sheet copper was used for the 415-ft long, 120-ft wide structure. *From Copper and Brass Bulletin, published by Copper and Brass Research Association, New York, N. Y.*

Cartoons Aid Efficiency

THOUSANDS OF HOURS are being saved in clerical work in our offices with the use of "magnetic cartoons"

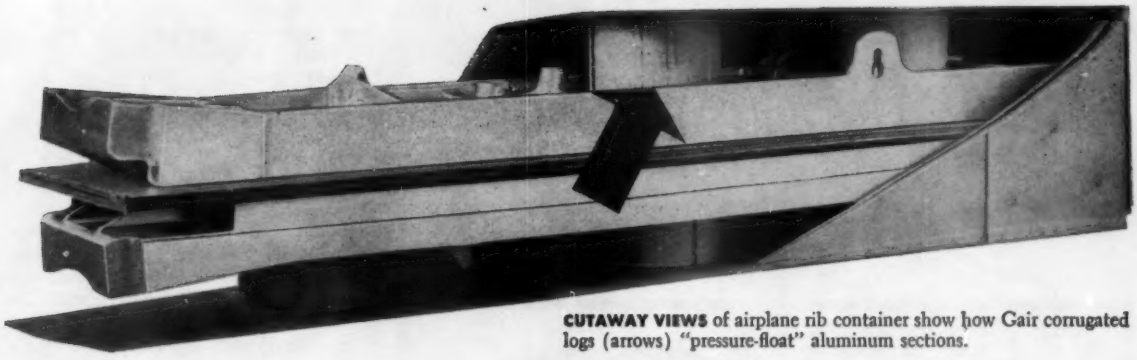
Magnetic blackboard shows work flow



Magnet is affixed to back of cartoon

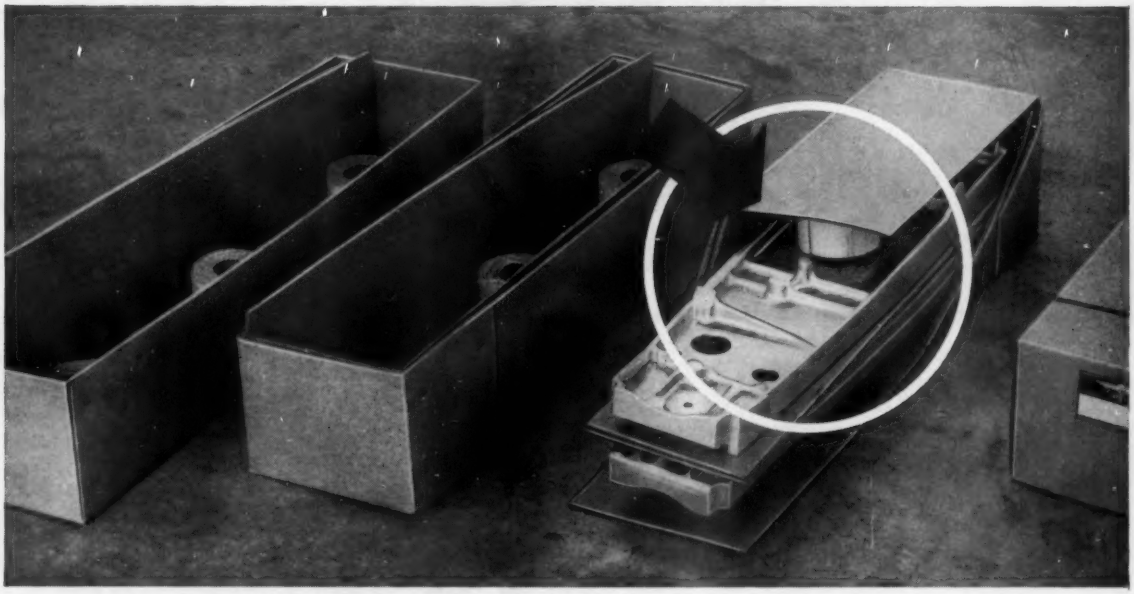
to explain the function of various departments and the flow of paper work through them.

This cartoon method has contributed to increased efficiency among employees handling purchase orders, re-



CUTAWAY VIEWS of airplane rib container show how Gair corrugated logs (arrows) "pressure-float" aluminum sections.

Gair corrugated logs provide safe ride for contoured aircraft ribs



Thirty-five pounds of odd-shaped aluminum airplane rib posed quite a packaging problem for MPM, Inc., Cleveland specialists in Kellering and contouring aircraft parts.

Chief difficulty facing the Gair Container experts called in by MPM was securing the long, contoured aluminum sections inside the container to prevent damage in transit. Gair's imaginative and cost-cutting solution featured one of the industry's first uses of corrugated logs instead of intricately cut and creased packing sheets.

Six corrugated logs "pressure-float" the parts so effectively that no damage has occurred in the 1500 shipments completed to date.

Good example, we feel, of Gair's ability to come up with an out-of-the-ordinary container to solve a tough shipping problem. If you've got one that seems to defy solution, put Gair to work on it.

YOU'RE LIVING NEXT DOOR TO THE EXPERT

GAIR CONTAINER PLANTS: Atlanta, Ga. • Cambridge, Mass. • Cleveland, Ohio • Holyoke, Mass. • Jackson, Miss. • Los Angeles, Cal. • Martinsville, Va. • New Orleans, La. • No. Tonowanda, N. Y. • Philadelphia, Pa. • Plymouth, Mich. • Portland, Conn. • Richmond, Va. • Syracuse, N. Y. • Teterboro, N. J.

SINCE 1864

GAIR

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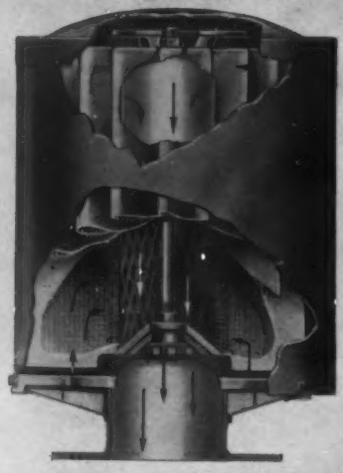
STAYNEW DRY TYPE
INTAKE FILTERS

NEED NO SERVICING



ONLY Staynew Intake Filters have the ability to remove air-borne particles without the necessity of viscous filter aids. Staynew's *Dry-Type* filtering medium becomes even more efficient as it accumulates dust. This *positive protection* keeps shutdowns and repairs at an absolute minimum, actually lengthening equipment life.

Staynew Intake Filters frequently operate two or more years without attention. There are no oil reservoirs to clean and refill—no oil coatings to renew.

NEW DATA ON INTAKE FILTERS CAN HELP SOLVE YOUR MAINTENANCE PROBLEMS . . .

Write today for Intake Filter Bulletin 100

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ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

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PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

ceiving reports, and other forms, and in simplifying paper work systems.

Method of illustrating functions and responsibilities with cartoons was developed to help explain complex systems and procedures to personnel. The cartoons show the flow of paper work and the relationship of various operations to one another, enabling employees to see quickly where their work fits in to the organization.

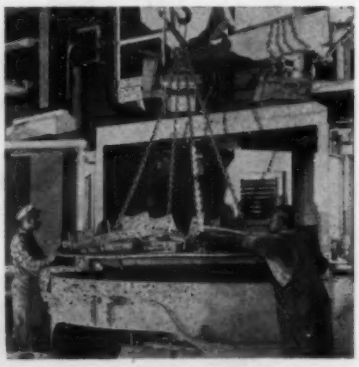
The cartoons, produced in the company's art department, illustrate various office jobs. They are backed with cardboard stiffeners on which small magnets are glued, which in turn, will cling to a metal blackboard. Chalk lines explain the sequence of the operation. *From a release of Convair Div. of General Dynamics Corporation, San Diego, Calif.*

Faster Blast Cleaning

STEEL PALLETS, which exactly fit the table of a blast cleaning machine, have allowed a Jacksonville, Fla., foundry to absorb loading time into the machine operating cycle when cleaning castings.

A Pangborn table is used to blast clean a pallet load of castings while operators load a second pallet and prepare it for positioning in the machine. This eliminates the time operators formerly spent waiting for a cleaning cycle to be completed so that they could empty and reload the machine.

Formerly, the operation required 24 hours a day, six days a week. Use of the pallets has reduced operating time to eight hours a day, and cut costs by one half. Table loadings range between 2000 lb and 5000 lb. *From a release for Pangborn Corp., Hagerstown, Maryland.*



Castings are loaded on to steel pallets which fit into blast cleaning machine

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Most of the cost is labor — Save it with

The average cost of replacing a broken window in a plant is $3.00; $2.65 of this is for labor and factory overhead. You can save this by using PLEXIGLAS acrylic plastic for glazing, to cut breakage to a minimum. How many windows do you replace per month in *your* plant?

Strong and resilient, PLEXIGLAS resists the enemies of industrial glazing—impact, vibration and twisting. It is available as clear material, and in translucent and transparent colors for control of solar heat and glare.

The coupon below will bring you detailed information and the names of dealers in your vicinity. Local sources of supply are also listed, under PLEXIGLAS, in the classified telephone directories of many cities.

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☐ a copy of your brochure on glazing.

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American Blower Axial Fans offer you

Unusual ease of installation

Because American Blower Axial Fans have cylindrical casings, you can install them in ductwork in a number of positions. This feature results in savings in handling and installation costs while the straight line airflow and universal mounting save space.

Available in either tubeaxial or vaneaxial design, American Blower Axial Fans are compact, self-contained units; occupy minimum space. Capacities range from 2,500 cfm to 75,000 cfm with either direct or V-belt drives.

Contact your nearest American Blower Branch Office for full data on axial fans or other air-handling and conditioning products. A trained sales engineer will help you select and apply the proper equipment.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturers in accordance with the Standard Test Code for Centrifugal, Axial, and Propeller Fans adopted jointly by the National Association of Fan Manufacturers, Inc. and the American Society of Heating and Ventilating Engineers.

AUTHORIZED BY N A F M

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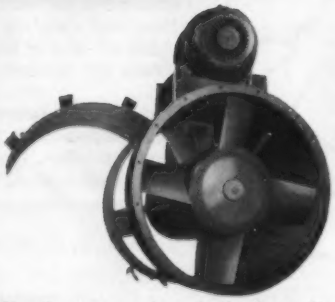
Certified Ratings

All ratings are in accordance with Standard Test Code for Centrifugal and Axial Fans adopted by Canadian Fan Manufacturers and American Society of Heating & Ventilating Engineers.

CFM



Two large access doors in the fan casing allow speedy inspection and cleaning.

Spray Booth Fan

The Spray Booth Vaneaxial Fan combines the efficiency and flexibility of the Vaneaxial Arrangement 9 with the convenience of two large, quick opening access doors in the fan casing. In addition to the doors, the design includes specially arranged guide vanes and increased running clearance between blade tips and casing to prevent clogging.

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AIR CONDITIONING, HEATING, VENTILATING EQUIPMENT
MECHANICAL DRAFT EQUIPMENT
INDUSTRIAL FANS AND BLOWERS
CENTRIFUGAL COMPRESSORS
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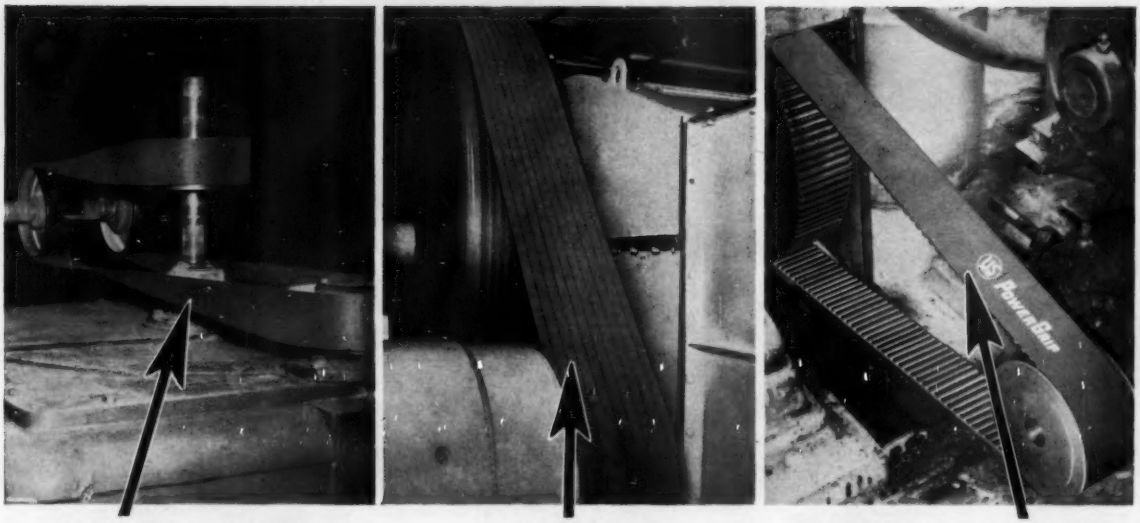

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Multiple V-Belts • F.H.P. V-Belts • SHEAVES •

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***PowerGrip* "TIMING" Belts and Pulleys**

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OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Rubber Hose Handles Acid

AFTER TWO AND A HALF YEARS of field trials, a new type of hose featuring a tubular lining of chemical rubber is being introduced commercially. Resistance to strong oxidizing acids and other chemicals is its strong point.

Evidence of durability is the way the hose has performed in contact with chromic acid—one of rubber's worst enemies. The Hilfinger Corporation, Toledo, Ohio, electroplaters, has used one hose at three month intervals, for two and a half years, to transfer chromic acid solution from the chromium-plating machines to storage tanks, to permit removal of sludge accumulation from the plating units.

In constant contact with the acid during the entire two-day cleaning operation, the hose doesn't get flushed out until 4400 gallons of acid have been cycled. When the solution temperature runs about 105 F, and concentration 40 per cent chromic acid by weight, the company reports that they averaged only six to eight months of service from any acid hose formerly used. After 30 months, the hose lined with "Hypalon" chemical rubber still shows no cracks or signs of deterioration, and has already cut Hilfinger's hose replacement costs by 70 per cent.

Hose with chemical rubber lining handles acid transfer in plating units

Other field tests with the hose have shown outstanding results in 98 per cent sulfuric acid applications, 15 per cent sodium hypochlorite, 50 per cent sodium hydroxide, calcium hypochlorite bleach liquor and calcium bisulfite cooking liquor.

Standby Diesel Generator Provides Personnel Safety

CONSIDERATION of the dangerous possibilities of a sudden power failure led to the installation of a standby power system at Shwayder Brothers Inc., Denver, Colo. Special circuits were run off a 90 kw Caterpillar D236 Diesel Electric set, for critical lights and heating facility motors. The 220 volt, 3 phase generator provides the full 220 volts to the motors and 127 volts to the lighting circuits.

The engine is fitted with a special automatic air starting device that insures the generator providing a full power load to the emergency circuit within five seconds after a power failure. Continual circulation of 60 F water through the engine cooling system keeps the engine in readiness.

Complete stoppage of all electric power into the plant is not required to turn on the engine. A failure on any of seven key circuits will automatically start the engine and provide power to all lights and motors on the emergency circuit. The circuits are wired so that even if one circuit is completely taken out, the generator will provide power to the remainder.

Although no manufacturing machinery can be powered by the emergency generator, heat and light are provided in the plant wherever employees are likely to be at the time of a power failure. In the boiler room circuit, the motors which power the fuel pumps

(Continued on page 54)

Fixture Built in Shipyard Repair Shop Holds Valves for Machining

DEVELOPED IN the San Francisco Naval Shipyard, a v-block fixture has simplified the repair of valves. Basically, the fixture consists of a flat plate, one end of which mounts a v-block section, the other end being fitted with a screw jack in a slotted mounting.

A valve being repaired is set into the v-block, with the jack fitting into the valve body. Positioning of the valve is done by raising or lowering the jack, and adjusting clamps that extend out from the v-block. Adjustment for valve length is done by moving jack in slide holding its base.

A standard hold-down clamp keeps the valve in position on the jack, and when the entire assembly is mounted on a vertical turret lathe for machining, the fixture is secured to the lathe table with standard clamps.

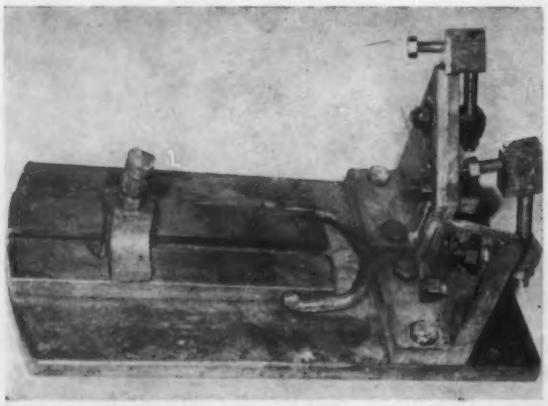

Fig. 1. V-block fixture for holding valves during machining

Fig. 2. Fixture and positioned valve mounted on lathe table

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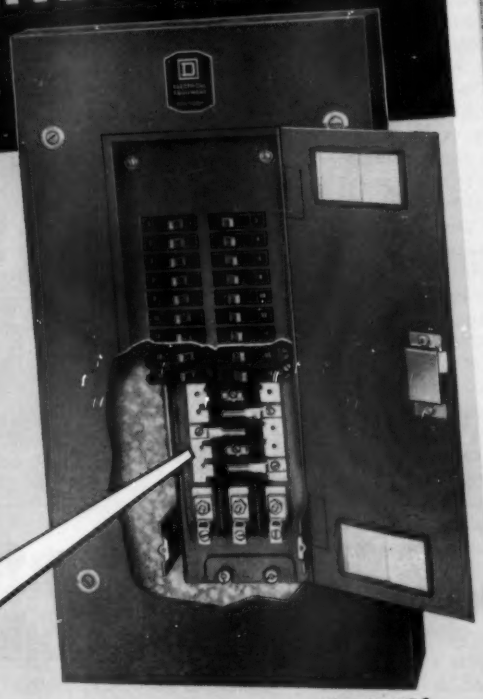
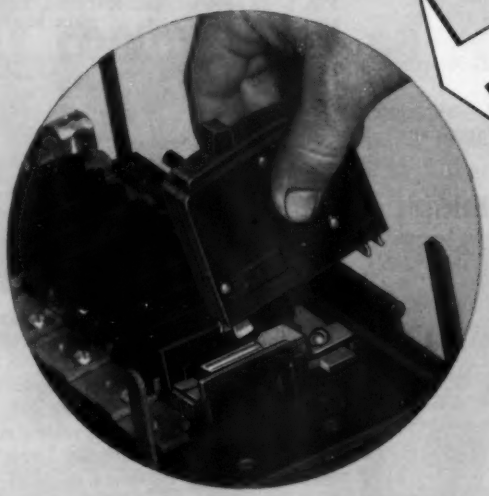
Terrific!

NQO LIGHTING PANELBOARD *with* QO... FINEST BREAKER EVER BUILT!



...Get the complete line "Off-the-Shelf" from your Electrical Distributor or have assembled panels shipped right to the job

It's a top quality line throughout! Note the compact, streamlined beauty. A closer look reveals such outstanding features as: Distributed phase bus arrangement with clear identification for simplified load balancing. Adjustable, indicating trim clamps. Galvanized box with large gutters for real accessibility, yet compact enough to mount between 16" wall studs. Most important of all—the new NQO panelboard offers you the finest breaker ever built, with exclusive **SWINGRIP** mounting.



NEW QO BREAKER with Exclusive SWINGRIP mounting

No other breaker has all these features which make QO the finest breaker ever built!

- Plug-In for maximum flexibility as well as ease of installation and maintenance.
- Quick-make, quick-break mechanism provides positive operation, has excellent "feel". Assures positive operation and long life under all circuit switching conditions.
- Compensated thermal trip enables breaker to carry full allowable load under varying ambient temperatures.
- Sensitive calibrated magnetic trip assures quick and consistent response to harmful overloads or short circuits.
- Non-interchangeable design discourages the use of 30, 40 and 50 ampere units where 15 or 20 ampere breakers have been installed.
- Trip indication on overload or short. Handle moves to middle position.
- Positive action of handle against contact members guarantees circuit opening.
- Compact design—¾" width for each pole conserves valuable space.
- Exclusive **SWINGRIP** mounting provides easier installation, automatic alignment, positive contact with bus bars.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

OPERATION—PRODUCTION

(O and P begins on page 52)

and blowers are on manual control, although they are on the emergency circuit. The manual start feature is a precautionary measure to assure a visual check that all of the equipment is restored to service.

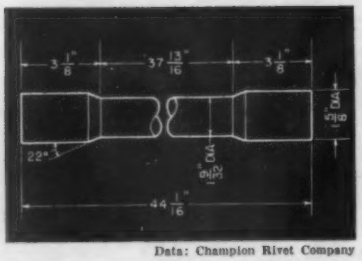
At Shwayder Bros., the standby unit serves as more than insurance for a prolonged outage. It has been successfully used as a light source during plant expansion work.

During the last two years, this expansion has required rewiring, new transformer capacities and changes in power distribution. For rewiring work, usually done at night, the engine is turned on, the "hot" circuit shut off and the repairmen use light from the emergency circuit to work, without handling extensions or portable lighting arrangements. Flood lights in the transformer vaults are also connected into the emergency circuit.

The only machines operating from the standby unit are repair tools in the maintenance department.

Upset Forging Upsets Costs

TO FABRICATE a long drive shaft with a short splined section at each end, it was originally planned to use 'K' Monel stock of sufficient diameter to allow for the splines, and remove



Data: Champion Rivet Company

Drawing shows dimensions of fabricated shaft after forging, machining

the excess metal in the center section of the shaft. The shaft was to be over 44 in. long, with a working diameter of $1\frac{9}{32}$ in., and $1\frac{5}{8}$ in. diameter splined ends, with approximately ¼ in. of metal removed from center section.

By upset forging the ends of the shaft to the spline diameter required, it was possible to fabricate the shaft from $1\frac{9}{32}$ in. diameter stock, rather than stock of the larger spline diameter. The potential loss of Monel by machining was eliminated, and the time required to complete the shaft was considerably less than it would have been if the shaft had been fully machined, according to a report published by the Industrial Fasteners Institute.

Magnets Give Production Assist

SPECIALLY-DESIGNED magnetic fixtures are instrumental in the production of metal diffuser grills and registers at Hart & Cooley Manufacturing Co., Holland, Michigan.

In a welding operation, joining steel register frames, two magnets, mounted at right angles to each other, act as quick clamps to hold frame components in position for spot welding. Primary difficulty in performing this operation had been in squaring up the two pieces, in order to produce a near-perfect corner. With the magnets mounted on a permanent frame, they "pull" each component into position under the spot welding head, and hold them there in alignment.

In a punching application on thin gage steel, another pair of magnets are performing an aligning function, by positioning each component accurately under the die, before it descends to punch as many as 24 holes in the workpiece.

The operator merely positions the steel frame or workpiece against a stop at one end of the die. The pull of the magnets snaps the part tightly against the die.

After the holes have been punched,

Fig. 1. In spot welding operation, magnets hold frame parts at right angles

Fig. 2. Magnet-fitted press die. Air-operated knockout between magnets

an air-operated knockout automatically ejects the finished part.

The magnets used are all permanent type, supplied by the Carboloy Department of General Electric Co.

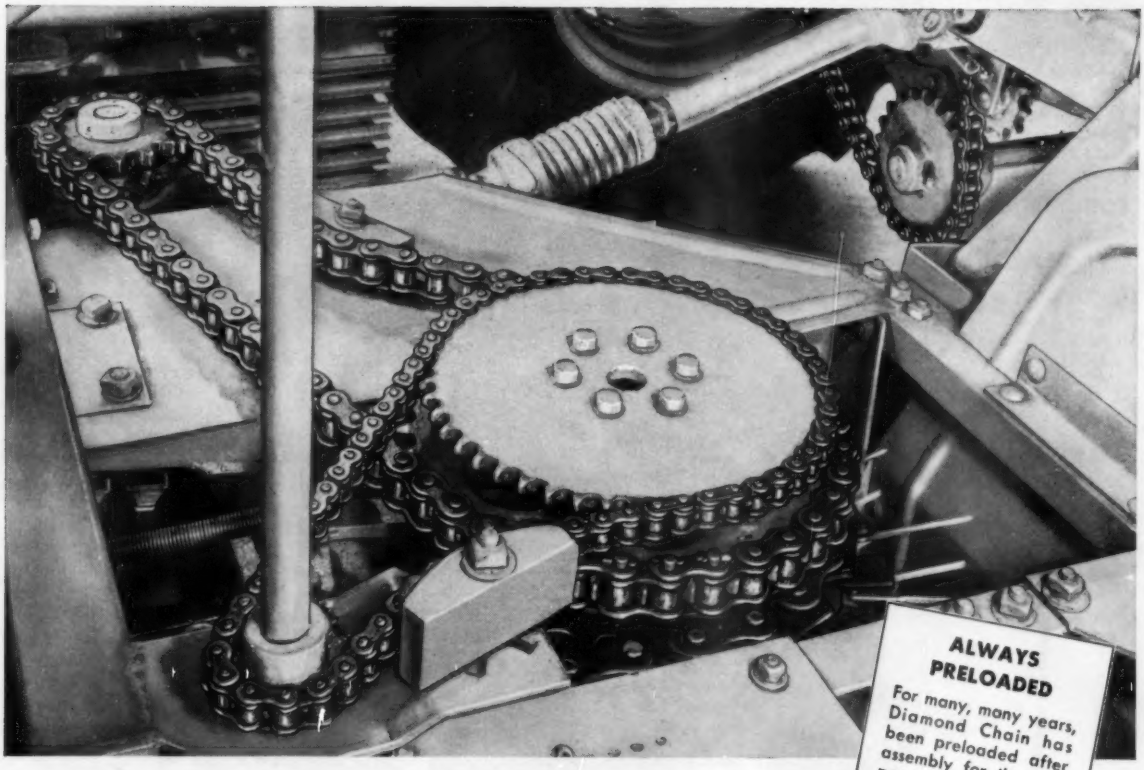
Bulk Loader "Doubles in Brass" to Handle Construction Materials

Ingenuity in materials handling evidenced at the site of the Tecolote Tunnel, near Santa Barbara, Calif. Hough Payloader bucket fitted with boom handles mine car trackage in addition to miscellaneous materials and equipment

Multiple-Use Cartons Cut Costs

CARDBOARD CARTONS at Martin Aircraft Co., Baltimore, Md., are being re-used for storage and intra-plant transport of electronic sub-assemblies. Each carton is being used as many as 15 to 20 times, with a great saving in replacement costs for the cartons.

Breakdown of the cartons was contributing only slightly to the need for discarding cartons after two or three



ALWAYS PRELOADED

For many, many years, Diamond Chain has been preloaded after assembly for the purpose of bringing pin-bushing seating into stabilized relationship prior to field installation.

HOW ELSE CAN SEVERAL MOTIONS BE COORDINATED SO ECONOMICALLY?

Plant production engineers and executives, and machinery designers have found thousands of applications for Diamond Roller Chain during the past 65 years . . . They have found many times that results are accomplished that would be very difficult by any other means.

Performance is assured with economy in first cost and maintenance. High efficiency, long-life non-slipping operation and the universally recognized high uniform quality continue to make Diamond Roller Chain first choice.

Our experienced engineering staff is ready at all times to make practical recommendations.

DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

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Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

Write for Catalog 754 Stock Roller Chains and Sprockets

Contents include:

- How to select Stock Roller Chain Drives
- Ready-to-use chain length tables.
- Table of speed ratios for sprocket combinations
- Sprocket selection tables for chains, all pitches
- Stainless Steel and Bronze chains

The Roller Chain **is DIAMOND**

TRADE ◇® MARK

For more facts circle 540 on Reply Card

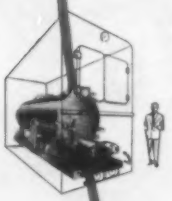
CYCLOTHERM CYCLONIC COMBUSTION

The most efficient method of combustion in steam generation!

Cyclotherm Steam and Hot Water Generators
10 to 500 hp
15 to 200 psi

Unequalled Heat Transfer Efficiency!

Cyclotherm Cyclonic Combustion guarantees a minimum 80% efficiency in oil and/or gas. Utilizes the largest possible heating area in the firetube. A flaming vortex spirals the length of the firetube. A thin layer of air prevents flame impingement . . . localized "hot spots" . . . and heat-retarding scale.

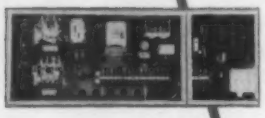


The Most Advanced Design!

Cyclotherm Cyclonic Combustion achieves its high heat transfer rate in only 2 passes. Permits a simplified design that reduces maintenance costs as much as 50%. Cyclotherm is as much as ⅓ smaller than other packaged units.

Completely Assembled On Arrival!

Factory-tested Cyclotherm costs less to ship because it's lighter in weight. Factory-insulation with fiberglas saves you up to $500 or $600. Installation requires only 5 connections. All parts necessary for safe, efficient, economical operation are supplied.



Automatic In Operation!

Electronic controls halt the Cyclotherm burner whenever operation is interrupted. A factory-pre-set water-level control automatically insures a sufficient supply of water always in the boiler. A low water cut-off control stops operation if the water supply is interrupted.

This free, information-packed booklet tells how Cyclotherm will help you achieve savings in time, costs and space. MAIL THIS COUPON TODAY!

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Steam & Hot Water Generators

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Please send me your free booklet which shows me how I can save time, money and space with Cyclotherm.

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For more facts circle 541 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

Operator inserts assembly into carton which is starting its fourth "trip"

trips, but the identification numbers written all over the boxes were using up all available space for future identification marks.

Now, a form is stencilled on the side of each box, providing spaces for marking numbers for fifteen or more assemblies, and the carton is available for re-use many times before it is worn out by physical wear and tear.

Solar Furnaces— Searchlights Reverse Their Beam

THERMODYNAMICS ENGINEERS at Convair Division of General Dynamics Corporation have devised efficient solar furnaces from war-surplus anti-aircraft search lights.

Costing only $400 apiece, three 60-in. searchlights were converted for use in the high-temperature testing of metals, plastics, ceramics and other materials used in aircraft and missiles.

Conversion of the searchlights results in solar furnaces that produce temperatures of more than 7000 F. The searchlight mirrors concentrate sun rays into a spot smaller than a dime, and at this point the highest temperatures exist. Under ideal atmospheric conditions and with a perfect parabolic mirror, solar furnaces can produce temperatures of 8500 F—approximately 85 per cent of the temperature of the sun's surface.

A special drill chuck holds specimens—about the size of a cigarette—at the focal point, which is 0.3 in. in diameter. The heat melts most common materials in seconds, and some specimens are shattered by thermal shock when moved into the focal point.

Only minor modifications were necessary to convert the searchlights into solar furnaces. The arc lighting mechanism and glass cover is removed, and a specimen holder is installed in

American Quality felt

...makes sweet music

Pianos contain American Quality Felt in various types to assure good tone, instant action and acoustical correction. Piano felts are most exacting, and American leads in this field. No wonder industrial users find that American felts make sweet music for them, protecting the performance and reputation of the machines that use them for lubrication, sealing, vibration control, filtration, honing, weatherstripping, insulation. It is important to select the right type of felt; American engineers will collaborate with you on specific applications.

American Felt Company
TRADE MARK ®

FREE! Booklet on the use of economical and efficient felt mountings for machines, absorbing up to 85% of vibration. Write for "How to Reduce Vibration."

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SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Dallas, San Francisco, Los Angeles, Portland, Seattle, Montreal.—PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I.—ENGINEERING AND RESEARCH LABORATORIES: Glenville, Conn.

For more facts circle 542 on Reply Card

Spool-type
Rubber Expansion Joint

Rectangular-type
Rubber Expansion Joint

U-type
Rubber Expansion Joint

There's a GARLOCK EXPANSION JOINT for your piping applications

All-Teflon* Expansion Joint

Rubber Expansion Joint with Teflon liner

Expansion Joint for use on Haveg and Duriron piping

- **To stop vibration, flange breakage**
- **To relieve stresses and strains in piping and equipment**

Garlock manufactures a *complete* line of expansion joints specifically designed to meet the requirements of different types of service. **Rubber Expansion Joints** are made in all pipe sizes from ¾" to 72" for water, air, or exhaust steam. They are furnished in round, rectangular, tapered or offset; spool-type and U-type.

All "Teflon" Joints or **Rubber Joints with Teflon liner** are made for chemical service; **Neoprene Joints** for oil service. Specially designed Rubber Expansion Joints are now available for use on piping and flanges made by **Haveg Corp.** and **The Duriron Co., Inc.**

Write today for Expansion Joint Folder AD-137.

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In Canada: The Garlock Packing Company of Canada Ltd., Toronto, Ont.

*The Du Pont Company's Trademark

GARLOCK

PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS, RUBBER EXPANSION JOINTS

For more facts circle 543 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

Fig. 1. Converted searchlight is focused on the sun to become solar furnace

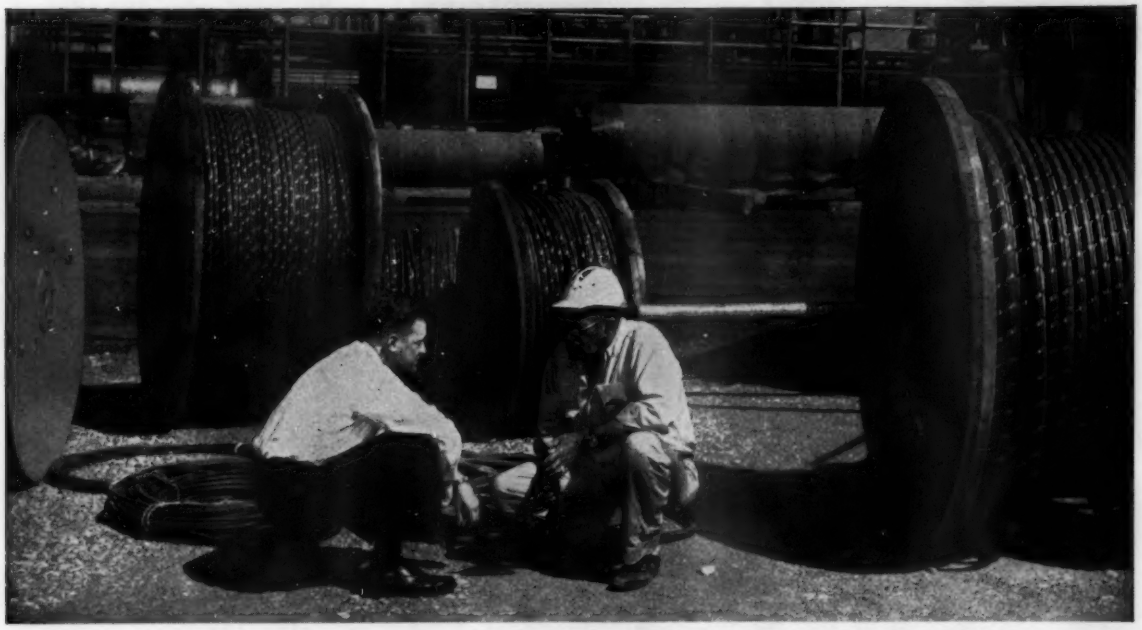
Fig. 2. Closeup of specimen and holder shows intense heat at the focal point

each unit. Adjustment handles are attached to the specimen holder, to facilitate moving the test samples into and out of the focal point.

Deburring By Brush

A WIRE BRUSH mounted on a tapping machine is being used to remove steel chips and burrs in the threads of stainless steel coupling nuts at Osborn Manufacturing Company, Cleveland, Ohio. Prior to the use of this brushing method, which has eliminated assembly bottlenecks, the operation was performed by hand and required rigid inspection.

The brush, made of 0.005-in. stainless steel wire fill, is driven into the nut at 100 fpm, then reversed and brought out at 200 fpm. As the brush



Paul E. Sholders (right) talks it over with Du Pont technical representative J. P. Davidson. Reels of neoprene-jacketed telephone cable are in background.

"You can't beat neoprene-jacketed cable for corrosion resistance"

—*says Paul E. Sholders*, Electrical and Instrument Foreman at Ohio Oil Co. Refinery, Robinson, Ill.

"Corrosive chemical vapors, weathering, and exposure—they all gang up on overhead telephone cable in a refinery," continues Mr. Sholders. "Less than five years ago we installed one type of telephone cable, and we're already replacing 2½ miles of it. This time we're using cable with a neoprene jacket and a stainless steel carrier. We expect to get a lot longer service with the neoprene."

Mr. Sholders has reason to be confident. He knows from experience that neoprene jackets can take it. There are more than 20 miles of neoprene-jacketed control cable in the refinery—some of it 10 years old, and all in good condition. Neoprene jackets also guard aerial power cable and underground power cable up to 600 volts against electrolytic attack, oil and grease at this modern oil refinery.

In this new application, as in industrial rubber goods of all types, neoprene extends service life, cuts maintenance costs. Give your supplier a call. He'll be glad to show you the neoprene products he sells.

REMEMBER, OF ALL RESILIENT MATERIALS, ONLY NEOPRENE HAS BALANCED RESISTANCE TO:

- Corrosive atmospheres
- Oils, solvents, most chemicals
- Electrolytic attack
- Heat
- Sunlight and weathering
- Flex cracking
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- Oxidation and aging

NEOPRENE

The rubber made by Du Pont since 1932

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FREE! THE NEOPRENE NOTEBOOK. Every issue contains interesting stories about products made with neoprene. Actual case histories give you the facts about neoprene's longer service life. Clip this coupon to get on the mailing list.

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LIGHT...

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Duro-Test lamps are America's best . . . exclusively designed for heavy industrial and commercial service.

Operating at their rated watts and volts, they far outlast conventional lamps, yet maintain high lumen output throughout life.

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WAREHOUSES IN PRINCIPAL CITIES FOR PROMPT SHIPMENT

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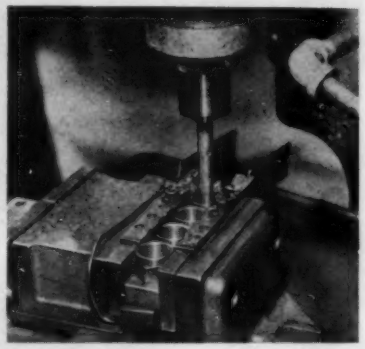
OPERATION—PRODUCTION

(O and P begins on page 52)



Wire brush quickly deburrs steel nuts

lifts clear of the nut, a new nut is inserted by hand at the front of the vise used to grip them. The deburred nut is forced out of the opposite side of the vise.

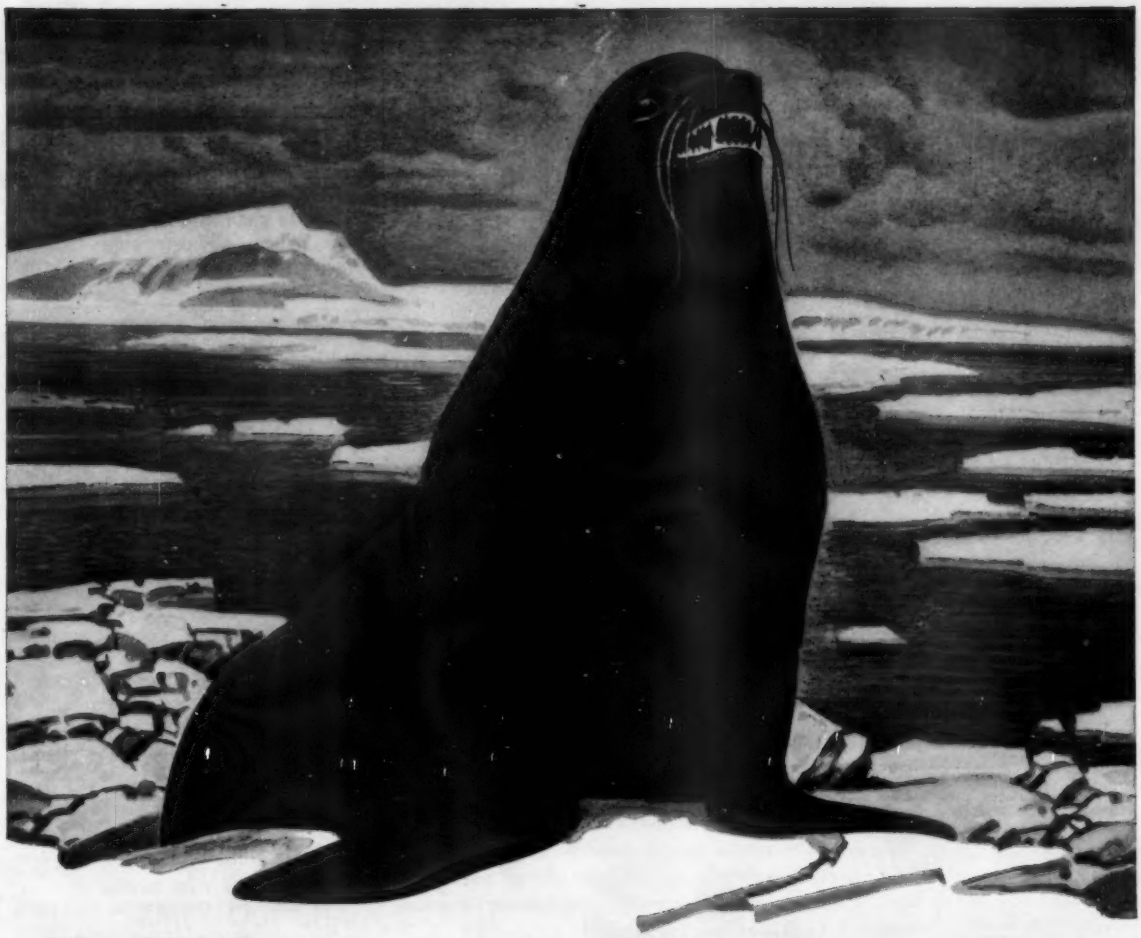
Camera Records Data

Contributed by Harold Wrigley
Barry Controls Incorporated

To PRESERVE oscilloscope records, Barry Controls Incorporated uses a Polaroid Land camera to take pictures

Fig. 1. Operator prepares to take Polaroid photograph of oscilloscope pattern

Fig. 2. One minute after pattern is photographed, print is ready to view



The Thicker the Coat the better the protection!

PITT CHEM®
Tar Base Coatings
are up to
10 times as thick

as ordinary paints

ORDINARY paints and coatings may look like they're doing a good job in your plant. But if they're under 5 mils thick, tests show that they'll probably fail within months in a corrosive atmosphere. It takes a thick, tough, durable protective coating to positively control industrial fumes, spillage and atmospheric corrosion. And that's exactly what you get when you specify Pitt Chem Tar Base Coatings.

Pitt Chem Coatings are formulated from coal tar pitch for only one purpose—to stop corrosion. They're tough. They're durable. And their applied coat is up to 10 times as thick as ordinary paint.

Let us show you how little it will cost you to do a really effective job of protecting your tanks, buildings and industrial equipment against costly corrosion. Call for a Pitt Chem survey today.

WAD 9489

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

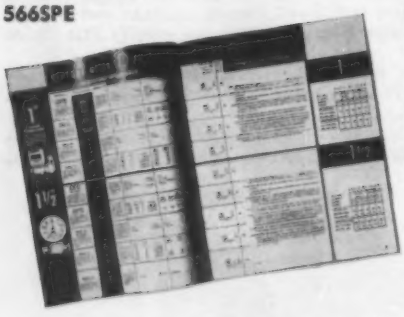
For more facts circle 546 on Reply Card

Three Neptune Meters Boost Production 200%

Less than half a minute of a man's time is required to measure three ingredients . . . corn syrup, liquid sugar, and water . . . into each batch of Nalley's table syrup. The operator simply pushes buttons on the Neptune Auto-Stop meters to set the pounds required by the formula, and opens the valves. The Auto-Stops shut off automatically . . . accurately . . . leaving the operator free to devote full attention to other details.

One man now produces more than three times as much as formerly was produced by five men handling bulk sugar and barreled corn syrup.

Ask for helpful Meter Selection Book **566SPE**



This Auto-Stop batching meter is only one of many models and sizes of Neptune meters . . . ranging from meters with simple counters to electric switch adaptations and remote control systems . . . now handling more than 150 different industrial liquids. Sizes from 25 to 1000 gpm. Bronze construction. Telephone or write nearest branch for full details.

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neptune Liquid METERS

For more facts circle 547 on Reply Card

OPERATION — PRODUCTION

(O and P begins on page 52)

of the graphs as they appear on the screen of the oscilloscope. The camera takes pictures of shock and vibration pulses, photographing the response of isolation mounts made by the company to these pulses as they appear on the screen. This procedure enables Barry's engineering department to keep a permanent record of all data on the performance of the isolation mounts.

A minute after taking a picture of a shock test on the oscilloscope, the developed and printed photograph becomes a permanent record of the graph as it appeared when the test was in operation.

The use of the camera saves valuable engineering time in that drawings of the graphs are eliminated and at the same time a completely accurate depiction of the graph is received. Pictures also can be enlarged and used as a means of generating the same pulse repeatedly by electrical means, rather than having to repeat a shock test.

Dry Chemical Coating Prevents Duct Fires

Contributed by Paul Bobick
Plant Engineer, Continental Can Co.

To MINIMIZE the fire hazard in exhaust ducts carrying oil-laden air, our Baltimore plant has adopted a dry chemical coating technique for the duct interiors.

Basic tool of the technique is a commercial dry chemical fire extinguisher, in this case made by Ansul Chemical Co., used to supply the chemical.

Purpose of the coating is to cover or dilute with the noncombustible powder the oil film which forms on the interior of the exhaust ducts. The propelling force of the extinguisher provides a means of distributing the powder throughout the duct.

Dry chemical fire extinguisher is discharged into duct opening to cover oil

For more facts circle 548 on Reply Card ⟶

ACCO products

The WRIGHT Hoist for the Job... Helps Build Production Profits

PURCHASE of WRIGHT Speedway Hoists means more than the cost **PRICE**. It means that you have the very best in plant lift equipment **PLUS** the longest-lived, hardest working hoists with a minimum of **MAINTENANCE** requirements. Production men find them more than the **EQUALS** of any hoists with their easy, smooth-running performance. Their **TOTAL** maintenance is so small and service so easy that "down time" **COST** is hardly considered in plants equipped with WRIGHT Speedway Hoists.

Write our York, Pa. office for any or all of these fully informative bulletins—
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

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Hoists
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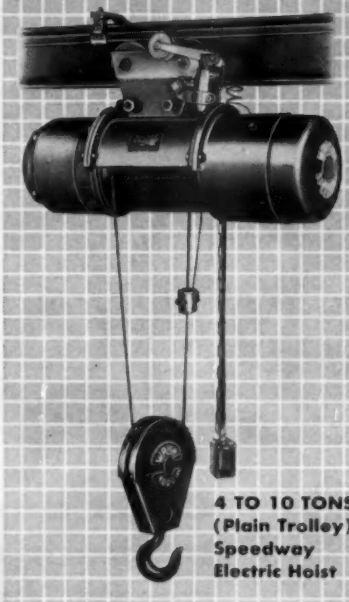
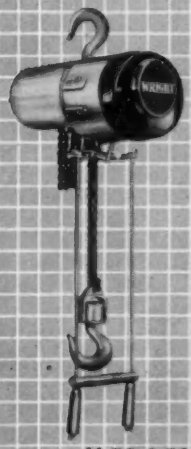
THE HOIST FOR THE JOB
(Frame 2 and 3)

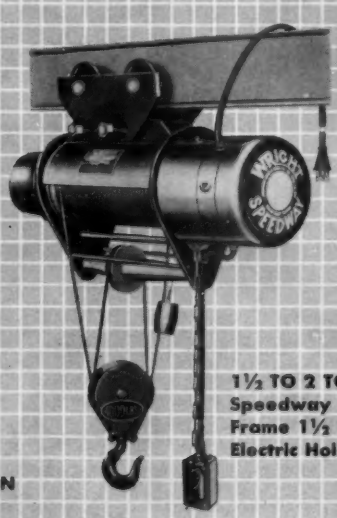


4 TO 10 TONS—
(Plain Trolley)
Speedway
Electric Hoist

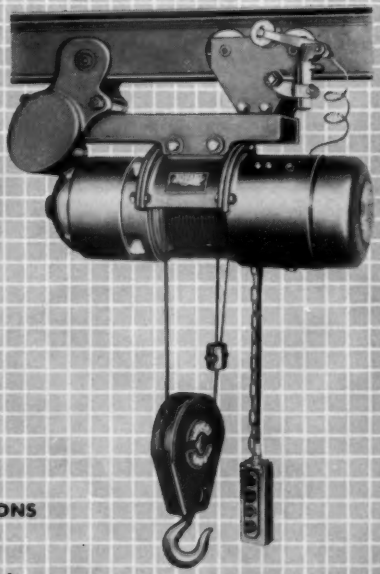


¼ TO 2 TONS
WRIGHT Electric
Roller Chain Hoist

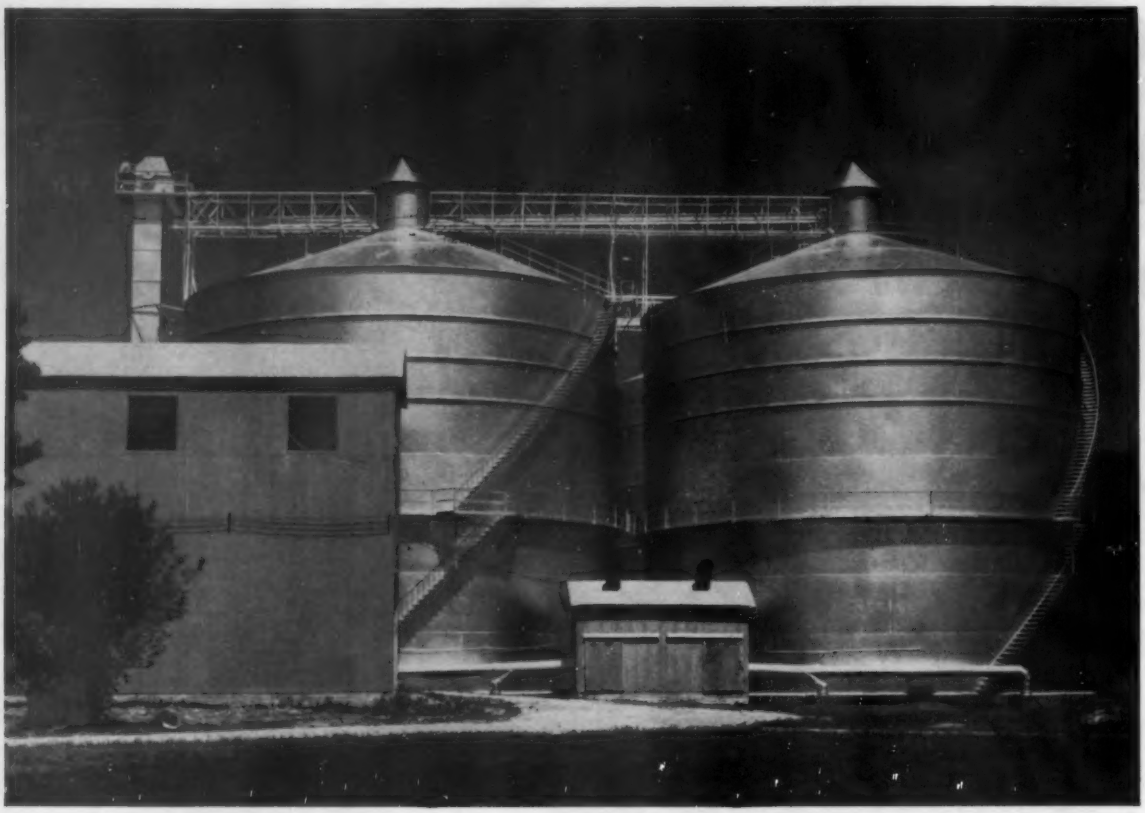
¼ TO 1 TON
Speedway
Frame 1
Electric Hoist



1½ TO 2 TONS
Speedway
Frame 1½
Electric Hoist



½ TO 6 TONS
(Motor Driven Trolley)
Speedway
Electric Hoist



CB&I tanks like these may be your answer for clean, dry storage

Shown are two 200,000-bushel Horton® steel tanks installed for soybean storage at the Osceola Products Company, Osceola, Arkansas. They are 70-feet in diameter and 60-feet high. A ventilating system in the bottom of each tank draws air down through the seed and cools it whenever excessive moisture causes the contents of the tank to become heated.

Perhaps this installation will suggest the answer to a problem that you may have involving the storage of clean, dry, free-flowing products.

Write our nearest office for estimates or quotations on any type of storage tank for liquids, gases, or free-flowing solids.

CBI

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
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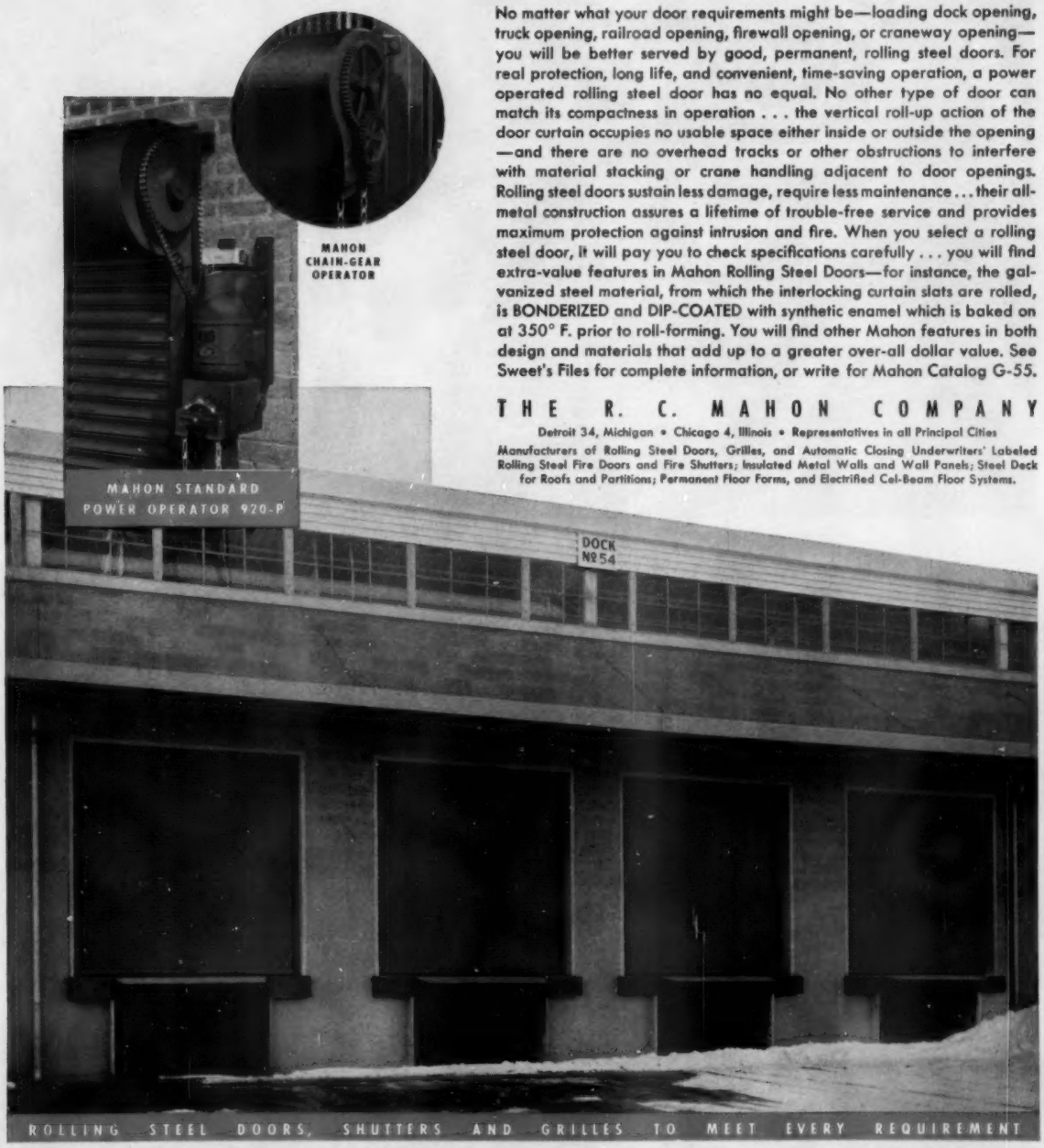
Rolling Steel Doors

Manually, Mechanically, or Electrically Operated



No matter what your door requirements might be—loading dock opening, truck opening, railroad opening, firewall opening, or craneway opening—you will be better served by good, permanent, rolling steel doors. For real protection, long life, and convenient, time-saving operation, a power operated rolling steel door has no equal. No other type of door can match its compactness in operation . . . the vertical roll-up action of the door curtain occupies no usable space either inside or outside the opening—and there are no overhead tracks or other obstructions to interfere with material stacking or crane handling adjacent to door openings. Rolling steel doors sustain less damage, require less maintenance . . . their all-metal construction assures a lifetime of trouble-free service and provides maximum protection against intrusion and fire. When you select a rolling steel door, it will pay you to check specifications carefully . . . you will find extra-value features in Mahon Rolling Steel Doors—for instance, the galvanized steel material, from which the interlocking curtain slats are rolled, is BONDERIZED and DIP-COATED with synthetic enamel which is baked on at 350° F. prior to roll-forming. You will find other Mahon features in both design and materials that add up to a greater over-all dollar value. See Sweet's Files for complete information, or write for Mahon Catalog G-55.

THE R. C. MAHON COMPANY

Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs and Partitions; Permanent Floor Forms, and Electrified Cel-Beam Floor Systems.

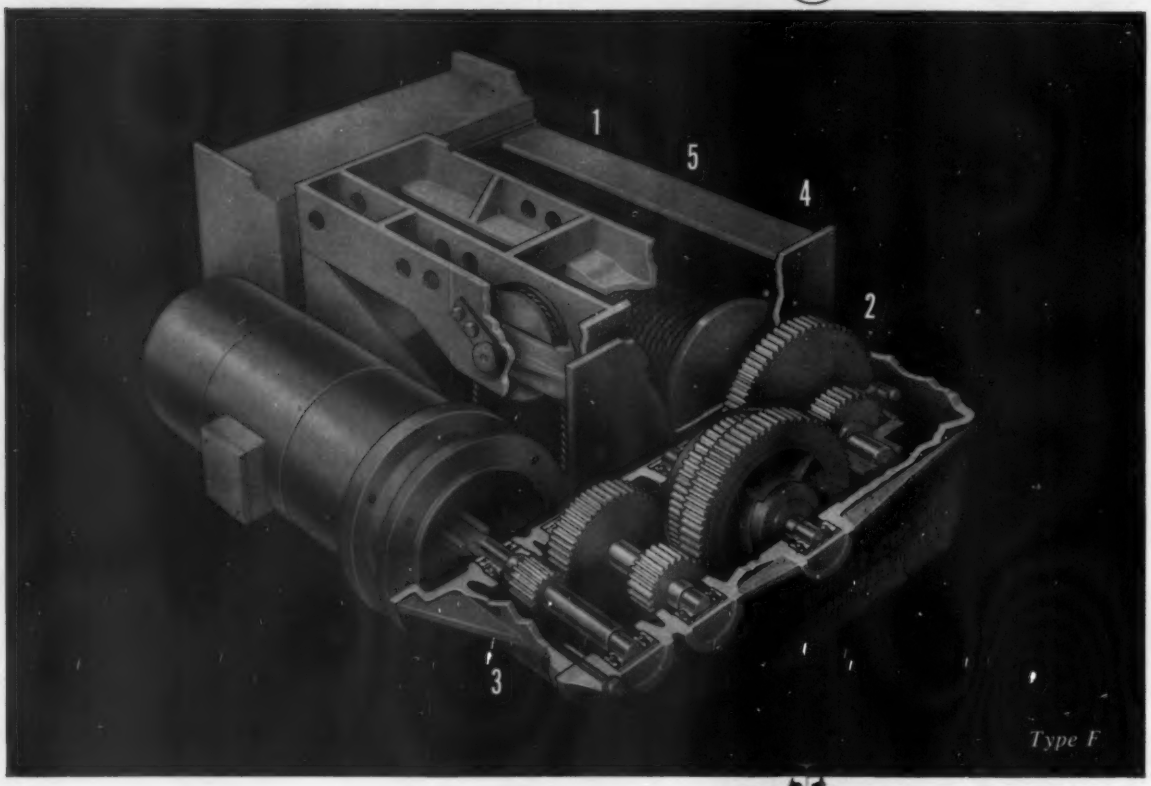
ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Four Mahon Power Operated Rolling Steel Doors installed in a loading dock with mechanical floor levelers in each opening. A total of thirty-nine Mahon Rolling Steel Doors were installed in various types of openings in this new Sutherland Paper Co. Plant, Kalamazoo, Mich. Miller-Davis Co., Designers and Gen. Contrs.

MAHON

For more facts circle 550 on Reply Card

TAKE IT UP WITH R&M HOISTS·CRANES·WINCHES



Type F

HOW "PATH OF STEEL" CONSTRUCTION SAVES YOU MONEY

Lift and move loads up to ten tons—and spend less on repairs, less on maintenance—with the lasting extra strength of Robbins & Myers' *all steel* "F" Hoists.

Check these points—from trolley to hook—

1. Electrically *welded steel frames,* solidly braced.
2. *Alloy steel* gears.
3. *Alloy steel* shafts, with ultimate tensile strength of 278,000 lbs. psi.
4. Drums of *heavy steel* pipe, with *steel* flanges, or, in larger models, of *solid* castings.
5. *Plow steel* wire rope, pre-formed, with 6 x 37 stranding, lubricated hemp center—extra flexible, extra strong.
6. *Steel* casting hook block, drop forged *steel* hook.

Send for full specifications—no obligation.

Bring your R & M hoist data files up to date. Send for free bulletin.

☐ Send Bulletin No. 801C ☐ Have Representative call

VENTILATORS | MOYNO PUMPS | HOISTS CRANES | MOTORS | FANS

ROBBINS & MYERS INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO

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MICRO SWITCH Precision Switches
A PRINCIPLE OF GOOD DESIGN

Here's a NEW, smaller size limit switch!

LONG LIFE...PRECISE ...2 CIRCUIT!

compact to fit in small space

Housing is 3-11/16" high, 1-9/16" deep and 1-17/32" wide.

versatile for any actuation

You can adjust it to operate clockwise, counter clockwise, or in both directions. Head may be positioned in 4 quadrants with actuation possible from any quadrant. Roller lever is adjustable through 360°, locking at any position.

sealed for any environment

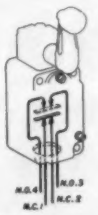
Seals on actuator shaft and between actuator head and housing provide maximum protection against entrance of dust, oil or other liquids.

New MICRO SWITCH LS Limit Switch

high capacity

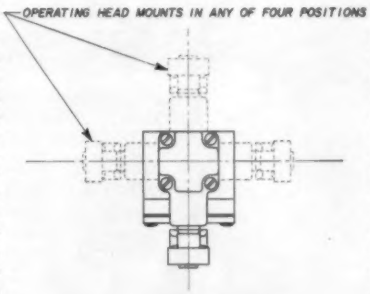
Rated at 10 amperes, 120, 240, 480 volts a-c; ½ HP, 115 volts a-c; 1 HP, 230 volts a-c; Pilot Duty—600 volts a-c, maximum.

See this new MICRO SWITCH "LS" Limit Switch at your local MICRO SWITCH Distributor. Look in the Yellow Pages of your phone book under "Switches, Electric"



Contact arrangement

Contact arrangement of basic switching unit is double-throw, two-circuit, single-pole, double break.



Adjustable head assembly

MICRO SWITCH products make plant equipment safer, more automatic and more productive

A complete line of snap-action and mercury switches

MICRO SWITCH provides a complete line of extremely reliable, small-size, high-capacity, snap-action precision switches and mercury switches. Available in a wide variety of sizes, shapes, weights, actuators and electrical characteristics. For all types of electrical controls.

MICRO SWITCH

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • **FREEPORT, ILLINOIS**

H HONEYWELL

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B&G HEAT EXCHANGERS
...FOR EVERY TYPE OF SERVICE!

TYPE "OC" STRAIGHT TUBES

Sound design, plus precision manufacture, assure efficient operation. Removable tube bundle easily cleaned inside and out. Minimum free annular area and baffles with close tolerances reduce by-passing around the tube bundle. Other features include high tensile strength bolting, full thickness tube sheet and ample metal ligaments between tube holes. ASME quality at no extra cost.

TYPE "U" U-BEND TUBES

Recommended where the lower price of a single tube sheet unit is a necessary economy. These exchangers are also desirable where temperature differential across the tube bundle is extreme. Features include external gaskets, full tube bundle and close tolerance baffles for minimum by-passing. Metal ligaments between tube holes are extra large for internal strength. High tensile strength bolting. ASME quality fabrication.

FUEL OIL PRE-HEATERS

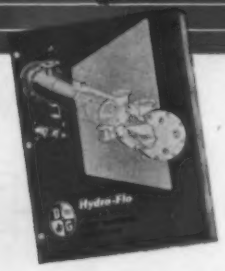
Reduce viscosity of heavy oils to permit pumping—control temperatures for proper atomizing of different oils. Units are available in straight tube and U-bend construction, for steam or water as the heating medium and with 2 to 10 passes.

GAS COOLERS

Efficient "air tube" design (air in tubes, water in shell) makes more effective use of cooling surfaces and reduces pressure drop. Cooling water is directed back and forth across tubes by baffles and moves in a direction counter to air flow.

TYPE "WU" WATER HEATERS

Produce large volumes of hot water from amazingly small units. Boiler water is pumped by a B & G Booster through the shell, greatly increasing the capacity of the heater. This also permits close control of service water temperature. Because of pumped circulation, connecting pipes and fittings are reduced in size, saving material and labor. "WU" Heater is instantaneous—no tank needed.



Send for this catalog of B & G Shell and Tube Heat Exchangers and Centrifugal Pumps.

BELL & GOSSETT
COMPANY
Dept. DY-53, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto, Canada

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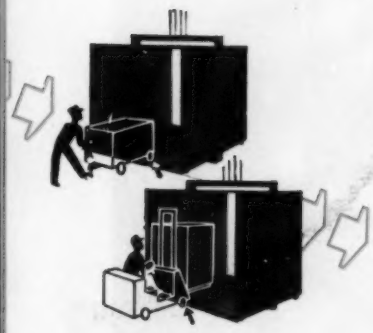
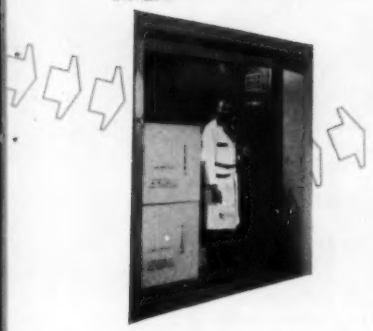


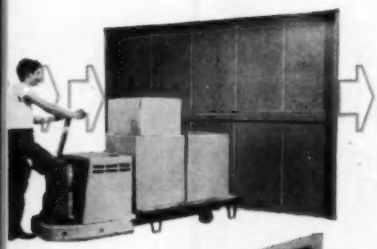
power trucks change the picture

It's necessary to change your thinking about freight elevators when you change from hand truck to power truck loading. A hand truck weighs about 500 pounds. Its relatively small pay loads are pulled into the elevator and distributed by hand. Full car loading is gradual. And the extra weight of the hand truck is unimportant. This type of traffic is easily handled by a conventional freight elevator. However, power truck loading completely changes this picture. A power truck may weigh 8,000 pounds, or more, plus its heavier pay load. It travels fast and stops quickly. Obviously, this type of traffic can be handled safely only in freight elevators and hoistways that have been specifically designed to take power truck "punishment"—as described in detail in Otis Heavy Duty Freight Elevators booklet B-705.



easily installed for light freight

Otis Light Duty freight elevators have a semi self-supporting framework that permits installation in new and existing hoistways without reinforcing the building, or adding overhead supports, or building a penthouse. They can be used for any rise up to 35 feet at a speed of 25 feet per minute with lifting capacities of 1,500, 2,000 and 2,500 pounds. They're described in Otis booklet B-720.

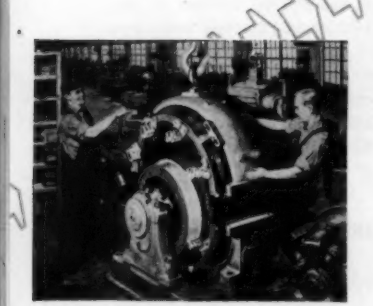


protective screen of safety

Otis engineers have developed a screen of safeguards around freight elevator entrances. A modern Otis freight elevator cannot be started until all car and hoistway doors are closed, and none of them can be opened while the car is moving through the hoistway. Doors can be opened only at a landing where the car is leveling or stopped. Power-operated Otis Hoistway Doors, for new or modernized installations, are described in booklet A-389.

freight elevators up-to-date?

A modern freight elevator is an efficient, safe, production tool for reducing materials handling costs. You can have freight elevators where you want them, when you want them—with or without attendants. Our unmatched experience in all fields of elevatoring qualifies us to advise on standard use or on special adaptations of Otis freight elevators for completely automatic production lines. This experience is available for any size installation, however large—or small!



the heart of the installation

You can look to your Otis gearless hoisting machine for almost endless service. You'll never wear it out. We'll tell you why. Otis machines are not adaptations of standard commercial equipment. They're specifically designed to meet the unique requirements of elevator service. All parts are built in Otis plants under rigid quality control. Another reason why the Otis trademark is the symbol of the world's finest elevators.

OTIS ELEVATOR COMPANY, 260 11th Ave., New York 1, N.Y.

OFFICES AND SERVICE IN 295 CITIES ACROSS THE U. S. AND CANADA

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directional arrows

for MATERIALS HANDLING

Light, General and Heavy Duty FREIGHT ELEVATORS

DUMBWAITERS

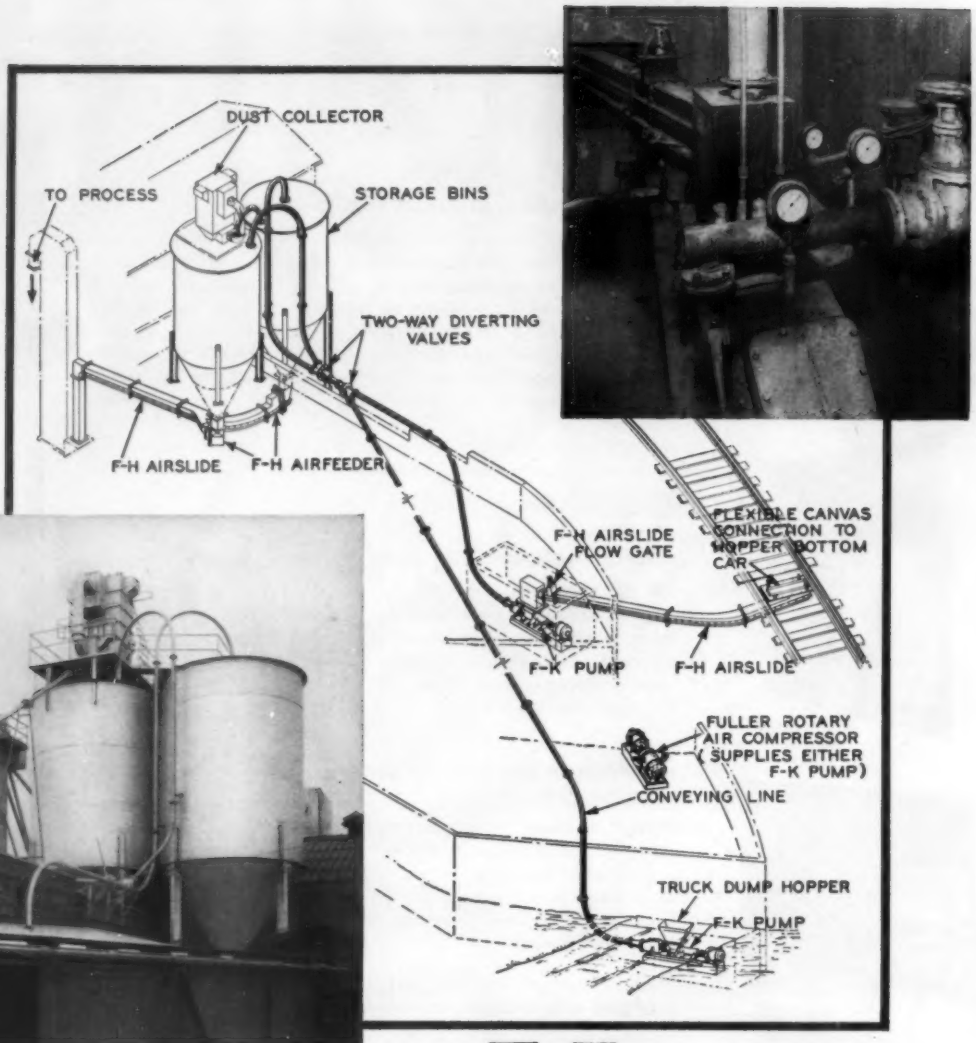
HOISTWAY DOORS

MODERNIZATION

MAINTENANCE

PASSENGER ELEVATORS

Otis



Certain-teed makes certain with Fuller

. . . Unloading and conveying system pays off

A few years ago, Certain-teed Products Corporation decided to find, if possible, more economical methods of operation in its York, Pa. plant. One problem given serious consideration was the handling of incoming limestone and slate filler dust received in bags, requiring costly, manual labor, resulting in breakage of bags with consequent loss of material and a dusty condition in the plant.

Together, Certain-teed and Fuller engineers made studies of their layout and came up with a solution—a combination of the Fuller-Kinyon Conveying System and F-H Airslides.

Two Fuller-Kinyon Pumps are used. One conveys limestone dust from hopper-bottom cars, utilizing the Airslide to convey from cars to the pump located in a pit in the plant. This pump conveys to either one of the two storage bins . . . efficient, clean, rapid transfer from cars to storage. The other pump handles the slate dust, delivered in trucks, also conveying to storage. Withdrawal of either material from storage bins is accomplished with Airslides, which discharge to an elevator delivering to process.

Air for the pumps is supplied by a Fuller Rotary Single-stage Compressor, having a capacity of 482 c.f.m. at 20-lb. pressure. Low-pressure air, for the Airslides, is supplied by a small blower.

It is reported that the savings realized by the use of this Fuller system has paid for the installation in less than two years of operation.

Possibly your materials handling is antiquated and costly, which could be remedied by a comparatively small investment. Why not find out . . . have a Fuller engineer study your operation and submit a report . . . it will cost you nothing, nor obligate you in any way.

FULLER COMPANY
Catasauqua, Pa.

Branch offices: Chicago—San Francisco—Los Angeles—Seattle—Birmingham

G-99
1157

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS . . . . PREHEATERS . . . . COMPRESSORS AND VACUUM PUMPS . . . . FEEDERS

For more facts circle 555 on Reply Card

AN AIR FILTER CURTAIN 5 Ft. Wide and 1 YEAR LONG!

ROLL-O-MATIC renewable media filter of two sections 5'0" x 8'0" high.

AAF Roll-O-MATIC OPERATES FULL YEAR ON SINGLE ROLL OF MEDIA

PICTURED above is a 5 ft. wide, 70 ft. long renewable media filter curtain for the new AAF ROLL-O-MATIC. When wrapped on a spool, this "blanket" of bonded glass fibers becomes a roll only 13" in diameter.

But here's the maintenance "miracle"! This single filter curtain, installed in a ROLL-O-MATIC section up to 11 ft. high (18,000 cfm) represents a full years supply of media under normal operating conditions. Its cost—just half that of disposable filters of equal capacity and you haven't spent that first man-hour dollar for maintenance.

Simplicity of operation adds further to ROLL-O-MATIC's savings story. The media travels as a continuous curtain down the face of the filter and is re-rolled at the bottom. Movement of curtain to maintain desired operating resistance is controlled by an automatic time switch.

For complete information on "clean air by the roll", call your local American Air Filter representative or write for ROLL-O-MATIC Bulletin 248.

AAF herman nelson

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

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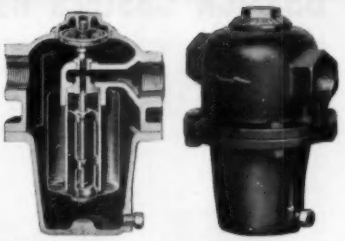
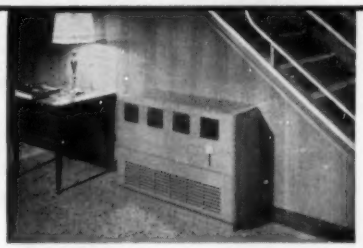
AAF herman nelson

BETTER AIR IS OUR BUSINESS!



illinois Float and Thermostatic Traps—made in three series for operating ranges from 50 pounds pressure to 25 inches vacuum.



herman nelson Console Heaters—a complete line of heaters for commercial and institutional applications, combining smart styling with proved efficiency. Available for steam or hot water in floor, wall and ceiling models.

AAF Type W ROTO-CLONE—a dynamic precipitator which, by the addition of water sprays, extends its effectiveness to the collection of the finest, lightest dust particles. Available in 1000 to 50,000 cfm capacities.

American Air Filter Company, Inc.
228 Central Avenue, Louisville 8, Ky.

I would appreciate receiving catalogs describing the following products—

- ☐ *Roll-O-MATIC* Air Filter
- ☐ **illinois** Traps
- ☐ *herman nelson* Heating and Ventilating Units
- ☐ **ROTO-CLONE** Dust Control Units

Name_____

Company_____

Street_____

City_____ State_____

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

Bassick casters handle up to 5 tons each

Designed for super heavy-duty

The strongest casters yet built, these big Bassicks are used in moving the heavy loads with safety—anything from boats to bombers—any load up to 10,000 pounds per caster.

Standing up under these enormous loads is only part of the job for these Bassick big boys. With the finest heavy-duty precision bearings, they move and swivel under their five-ton burdens easily, take shocks without a whimper.

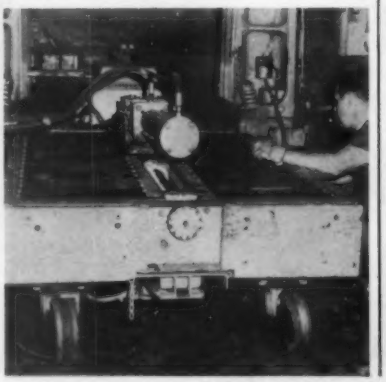
Production rolls

Engine stands on casters

Easy-rolling double wheel Bassick Casters on these roll-over engine build-up stands speed production in the final assembly area at this Stratford, Connecticut plant of the Lycoming Division of AVCO Manufacturing Corporation.

Machine tools of motion

That's what you'll call these Bassick Super Heavy-Duty Casters when you get a look at their construction features. Top plates and king pins are one-piece steel forgings. Horns and wheels are high-tensile malleable castings accurately machined to close limits. They're available with 8 in. and 10 in. wheels, standard tread or with V-grooves for use on angle track. The photo below shows hydraulic die wagon used by Fairchild Aircraft to handle overweight press dies.



The race isn't always to the swift

The casters on this injured turtle put us in mind of Aesop's old fable about the tortoise and the hare — and modern materials-handling.

The race *isn't* always to the swift. It's reliability that paid off for the tortoise against the hare — and it's reliability that makes Bassicks pay off against lesser casters.

Bassick casters, remember, have earned their keep in thousands of plants . . . on the toughest jobs. They'll help you save space, reduce costs, eliminate heavy physical labor, and increase your plant's capacity.

How your Bassick distributor can help

Make your industrial distributor a part of your materials-handling team. Two jobs he can do for you:

He'll keep the products you need flowing—from his stockroom—swiftly and economically into your plant.

He'll also show you new ways Bassick casters can help solve materials-handling problems. He's up on the latest improvements in equipment design, handling methods, new production concepts.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF STEWART SW WARNER
MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

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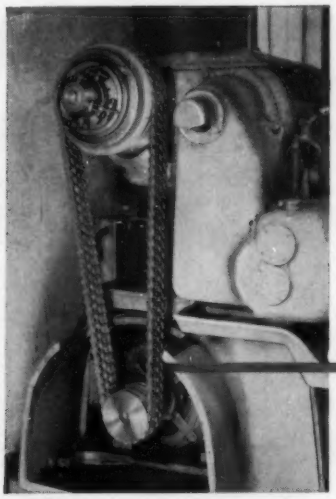


Performance Proves

20% to 90%

LESS VIBRATION

with Veelos—the Balanced V-belt

Engineers have long known that there are four principal causes of machine vibration: 1. bearings; 2. motor; 3. clutch; 4. sheaves. Often overlooked is a fifth cause: v-belts. And, in many instances, *v-belts alone* are the major cause of vibration.

There's a logical reason for this.

Regular v-belts have spots of varying density due to their construction. Normally, these spots are not apparent, yet they throw the belt out of balance when the drive is operating. As a result, vibration is created that can damage bearings, shafts and, most important, the finished work.

This is not true of Veelos v-belts.

Veelos is absolutely uniform throughout its entire length. Every link and every stud is identical. The smooth, machine-cut sides and the laminated construction assure smooth, vibrationless power delivery. Veelos is perfectly balanced.

In case after case, installation of Veelos v-belts has reduced machine vibration 20% to 90%.

Proof that Veelos will reduce vibration can easily be demonstrated with an electronic vibration analyser. This analyser measures amplitude of vibration to as low as 2-millionths of an inch.

Fifteen minutes of your time is all that is required to show you with the electronic analyser that Veelos creates less machine vibration. Drop us a line or clip the coupon for a demonstration.

VEELOS
THE LINK
V-BELT

Manheim Manufacturing & Belting Company
652 Manbel St., Manheim, Pa.

Yes, I would like a demonstration. **Have your representative call me for a convenient time.**

Name.....

Company.....

Address.....

.....

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Veelos is known as Veelink outside the United States.

zcv

For more facts circle 558 on Reply Card

√ Industry wipes out corrosion with Firestone Exon Resins

How does this acid-loaded truck STEER CLEAR OF CORROSION?

VYFLEX L-10* LINES THE TANKS!

Hydrofluosilicic acid is as hard to control as it is to pronounce. In Philadelphia, a Reader Bros. truck has to haul all of this highly corrosive acid the city needs for its water treatment. And in 6 months, it hasn't needed an hour's maintenance due to corrosion!

Reason: Reader Bros. Inc. had the tank, interior baffles, outlets and manholes lined with VYFLEX L-10 3/32" thick. Installation was quick, simple, and quite inexpensive. Maintenance costs—nil.

Installation by
Goodall Rubber Co., Trenton, N. J.

VYFLEX L-10 LINING
derives its immunity to corrosion from its base resin, Exon 900 series. These are only a part of the many Exon resins developed by Firestone engineers to help wipe out corrosion costs.

In plant after plant, lightweight structural rigid applications of unplasticized PVC are based on equally effective Exon resins.

The fact is, you *can* stop corrosion! Exon polyvinyl chloride resins provide a wide variety of versatile PVC materials to develop the answer to your specific corrosion problem.

Firestone

EXON®

For details that will interest you in particular, call or write:

CHEMICAL SALES DIVISION

FIRESTONE PLASTICS COMPANY, DEPT. 15-S, POTTSTOWN, PA.
A DIVISION OF THE FIRESTONE TIRE & RUBBER COMPANY

*Product of Kaykor Industries, Inc. Division of Kaye-Tex Mfg. Corp. Yardville, New Jersey
*Vyflex L-10 is made from Exon resins.

For more facts circle 559 on Reply Card

COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Oral Construction Contract

A MACHINE manufacturer in southern California asked a steel building company the cost for the construction of a foundry building. The machine manufacturer offered to pay $275,000. The steel company would undertake the construction for $280,000. The president of the machine manufacturer said, "One way or the other, $5,000 doesn't make any difference so long as we get the building on time."

Under this oral understanding the steel construction work continued for two weeks when work was ordered stopped by the manufacturer. In the suit against the machine manufacturer judgment was awarded the steel company for its expenses and loss of profits. The machine company appealed, contending that the construction contract was unenforceable as it was oral, uncertain and indefinite.

The steel company on the other hand maintained that the negotiations had amounted to a final contract and that at the machine company's request performance had been immediately commenced. The appellate court sustained this judgment against the manufacturer with the statement, "In the absence of a statutory requirement, an oral agreement reached by the parties is binding unless it is clear that the parties intended that the agreement was not to be effective until reduced to writing." Empire Steel Building Co. v. Harvey Machine Co., 265 Pac. 2d 32, California, January 4, 1954.

Payment for Information

DURING A severe coal shortage a dealer telephoned a plant owner that he knew the location of a large and available quantity of stoker coal. He agreed to disclose this information to the plant owner for 50 cents for each ton of coal he purchased from this source of supply. The offer was accepted and the information furnished the owner of the plant. From this source, 20,000 tons were taken by the plant owner. When he refused to pay as agreed the dealer sued and recovered a judgment for $10,000.

The appellate court in affirming that judgment said, "The agreement entered into constituted a contract supported by the respective considerations of mutual promises. The dealer agreed to furnish the information which apparently might be beneficial to the plant owner. The plant owner promised to pay for this information on the condition that he remove the coal from the stated source of supply. These mutual promises constituted a sufficient consideration for the contract.

"One who knows the locality of oil wells or mines or other valuable properties, may sell his knowledge to anyone willing to buy and the disclosure of the locality of such properties is a sufficient consideration for the purchaser's promise to pay." Brandis v. Helfrich, 265 S.W. 2d 371, Missouri, March 8, 1954.

Safety of Customers

IN ORDER TO purchase cloth sacks that the manufacturer had advertised for sale, it was necessary for a woman to go to the office of a Minnesota cereal manufacturer. The foreman said that the sacks were in the rear of the building on the floor above and accompanied the woman to a storeroom in which a stairway was concealed behind grain sacks piled against the stair railing.

The woman in inspecting the sacks stood with her back to this open stairway. When the foreman stepped forward to help her she stepped backwards and was instantly killed in her fall down the stairs.

A judgment was rendered against the company for the woman's death and in affirming that judgment the Supreme Court of that state said,

"It is well established that a merchant who displays wares on his pemises near some opening, stairway or obstruction and invites customers to inspect and to make selections therefrom cannot reasonably expect such customers to bestow the same degree of attention to their suroundings as would be required under other circumstances. In such a situation it is well settled that duty rests upon him to give adequate warning of the risks or dangers occasioned by such openings, stairways or obstructions." Harris v. Campbell Cereal Co., 67 N. W. 2d 824, Minnesota, December 17, 1954.

Cement Dust Damage

DAMAGES IN the amount of $25,000 for injury to his property were claimed by a resident of the state of Washington from the dust of a neighboring cement plant.

One witness testified that it would cost $75,000 to clean away the dust that had been accumulating for eleven years. The owner also contended that since a recovery of all but two of the eleven years in this period was barred by the statute of limitations he was entitled to 2/11ths of that amount of $13,636, which should be increased to $25,000 as much more dust had fallen during the last five years than during the first five or six years of the eleven year period.

"We have two problems before the court," said the judge at the trial of the case. "One is the measure of damage and, two, is there any evidence by which this can be taken out of the realm of fantasy without just pulling one out of the hat," and rendered judgment against the cement plant for $970.

The owner appealed from this decision and in affirming the judgment the Supreme Court of Washington said,

"In our judgment the owner of this property is entitled to $1,000 as damages for personal discomfort and nuisance and we dispose of the issue by directing that the judgment be modified by increasing the damages to that amount. This is done in the hope that further litigation can be obviated." Riblet v. Spokane-Portland Cement Co., 274 Pac. 2d 574, Washington, October 1, 1954.

Unenforceable Contract

EMPLOYER-employee contract consisting of a letter signed by a Kansas City manufacturer and endorsed, "accepted," by the employee, read: "I propose to employ you to work for me for 15 months at my option under the following conditions: $300 a month, 8½ hours day. If I fail to offer you work you are free to seek employment elsewhere. If any cause prevents you

COURT DECISIONS

from working for me, it is assumed that such cause would prevent you from working for others. If you breach any of the covenants herein contained you will immediately become liable for $500 as liquidated damages."

The employee after a short time refused to continue in this employment and the employer sued to collect the $500 stipulated as damages. In its decision holding that no recovery could be allowed the employer under this contract the court said,

"The employer was not obligated to employ this man for 15 months or for any other specified time. The employer by inserting the clause 'at my option' reserved the right to give the employee work if he saw fit and if he did not there was no obligation on him to do so and the employee would be without a remedy. In other words, the employee could not have enforced the contract. The employer seeks to bind the employee when he himself is not bound." Middleton v. Holecroft, 270 S.W. 2d 90, Missouri, June 7, 1954.

Public Utilities Commission

A STATUTE of Connecticut gave the selectmen of each town direction and control over the placement, erection and maintenance of public utility and power plants. An earlier statute had authorized the Public Utilities Commission of the state to order such reasonable improvements, repairs or alterations or changes as might be in the public interest.

When a utility of that state applied for a permit for the construction of a plant in the residential district, property owners protested that such an application was governed by the local zoning commission. The Supreme Court of the state, holding the zoning commission subject to the rulings of the Public Utilities Commission, said,

"It is the contention of these property owners that the legislature intended that local zoning authorities should have the sole power to regulate, restrict and in the legal exercise of their discretion, prevent the location of any plant or structure within their jurisdiction. If this is so then the Public Utilities Commission would be powerless to compel any electric service company to provide adequate service or to regulate it or to direct it in any way concerning its function of public service, if in so doing the commission contravened any regulation or order of a local zoning authority." Jennings v. Connecticut Lt. & Pr. Co., 103 Atl. 2d 535, Connecticut, February 9, 1954.

Employee's Photograph

AN EMPLOYEE of a Kansas airplane manufacturing plant was asked by his foreman if he would stand by a bomber and have his picture taken. He neither knew nor cared what disposition was to be made of the picture until it appeared in the manufacturer's advertisement in several magazines of national circulation.

Suit was brought then by this employee against the manufacturer in which he contended that he had been embarrassed and humiliated by the publication of his photograph and that his right of privacy had thus been violated.

This right of privacy the court defined as the right to be let alone, to be free from unwarranted publicity. In the application of this rule of law the court asserted that this right protects those of ordinary sensibilities but does not apply to instances of supersensitiveness. The invasion of the right of privacy must be one that causes mental distress and injury to a person with ordinary feelings.

In its denial of this employee's right to a recovery the court continued, that this man had made no objection to the publication of the picture nor had he prescribed any restrictions on its use. Further, it was clear that he knew that the picture was to be published.

"The right of privacy like other rights that rest in an individual may be waived by him," the court said in conclusion. "The waiver or relinquishment of this right or of some aspect may be implied from the conduct of the person and the surrounding circumstances."

Damages Claimed for Eviction

THE TENANT of a New Jersey plant, renting under a long lease, submitted to the owner what it called an option agreement for a new lease. The owner returned it unsigned to this tenant with another renewal agreement, signed by the owner with a request for the signature of the tenant.

The tenant, however, did not sign the agreement and upon the expiration of the original lease, was evicted by the owner. After the eviction the tenant sued for damages, claiming that it had acted upon this proposed renewal agreement which had been submitted by the owner. Further, that by the making of subleases under this renewal agreement it had accepted it by its conduct.

This agreement had provided that the right to renew was given to the tenant by the owner "for one dollar and other valuable consideration." In its decision denying the tenant a recovery the New Jersey court said,

"The pertinent question is whether this writing was without consideration and thus a mere offer or whether it was an option supported by a valid consideration.

"Insofar as one dollar is concerned the tenant admits it was never paid. And although it is an elementary principle that the law will not enter into an inquiry as to the adequacy of the consideration, it is equally well settled that consideration, no matter how small, must be the price bargained and paid for a promise and the inquiry whether the dollar was really bargained for as a consideration will always be pertinent." American Handkerchief Corp. v. Frannat Realty Corp., 109 Atl. 2d 793, New Jersey, December 6, 1954.

Notice of Injury

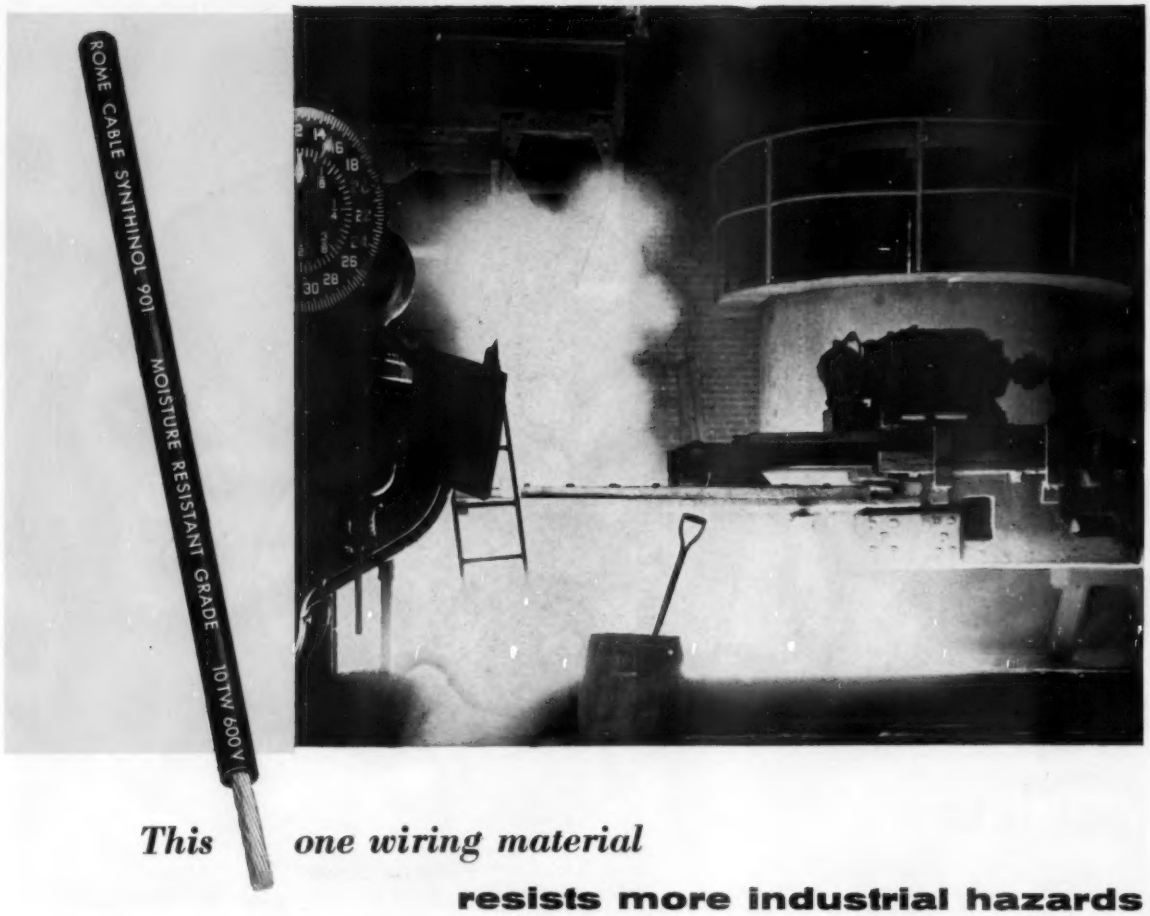
IN AN Oklahoma manufacturing plant a workman was injured in a fight with another employee. The other employee had been hit by a small welding bolt thrown by a third employee and in the fight that followed the injured man had been knocked over backwards against a machine.

The State Industrial Commission awarded him compensation for 67 weeks at $25 a week.

A statute in that state provides that notice of an injury for which compensation is claimed shall be given within 30 days after the injury and that the failure to give such notice, unless excused by the commissioner, on the ground that notice for some sufficient reason could not have been given or that the insurance carrier or employer has not been prejudiced, shall be a bar to any claims.

The Supreme Court of that state in sustaining this award said of the failure of the injured man to give this notice,

"The purpose of the statute requiring that an employee give written notice of his injury is to furnish prompt information to the employer in order that he may make a prompt and timely investigation. The employer had approximately six months after receiving notice of the injury. We think that the employer suffered no prejudice because of this employee's failure to give the statutory written notice." Nelson Electric Mfg. Co. v. Cartwright, 277 Pac. 2d 163, Oklahoma, November 30, 1954.



This one wiring material
resists more industrial hazards
than any other

You get these important approvals with this multi-purpose wire:

- U/L approval as Type TW for 60° C. under the National Electrical Code
- Conforms to standards of National Machine Tool Builders Association for machine tool wire
- U/L approval as appliance lead wire for 600 volts at 90° C. through size 4/0 AWG and for 105° C. on sizes No. 24 through No. 8 AWG

. . . a single versatile thermoplastic construction, Rome Synthinol® 901.

For the really tough jobs in industry . . .

If your wiring must withstand the deteriorating effects of cutting oils and solvents, acids or other chemicals, greases, moisture, steam, corrosive fumes, abrasion, flame, it will pay you to use Rome Synthinol 901. It's made for the "hot spots" in industry—chemical plants, refineries, paper mills, and the like.

These outstanding characteristics have been proved time and again *in actual use*. They're not claims based only on laboratory tests.

Refineries are typical . . .

In refineries, at the bulk loading stations, Rome Synthinol 901 has been continuously exposed to the damaging effects of *heat and oil*. Its inherent resistance to both enables Synthinol 901 to take this punishment indefinitely.

In chemical plants . . .

One source of explosion hazard in chemical plants is hydrocarbon oils. Where these are processed, Rome Synthinol 901 offers valuable protection because of its exceptional oil resistance.

A manufacturer of transformers uses Rome Synthinol 901 as original equipment, for coil leads. It does not contaminate the transformer oil, even though it's immersed in the oil over extended periods at continuous operating temperatures of 90° C. (or higher).

Unequaled performance . . .

For 600-volt service under extreme conditions of heat, moisture, corrosive fumes, oil or chemical corrosion, or combinations of all these, Rome Synthinol 901 outperforms comparable wiring material—rubber and polychloroprene compounds, and many of the other commonly used thermoplastics now on the market.

In this one wiring material, plant electrical engineers, industrial contractors, or original equipment manufacturers can get characteristics unequalled in any other wire.

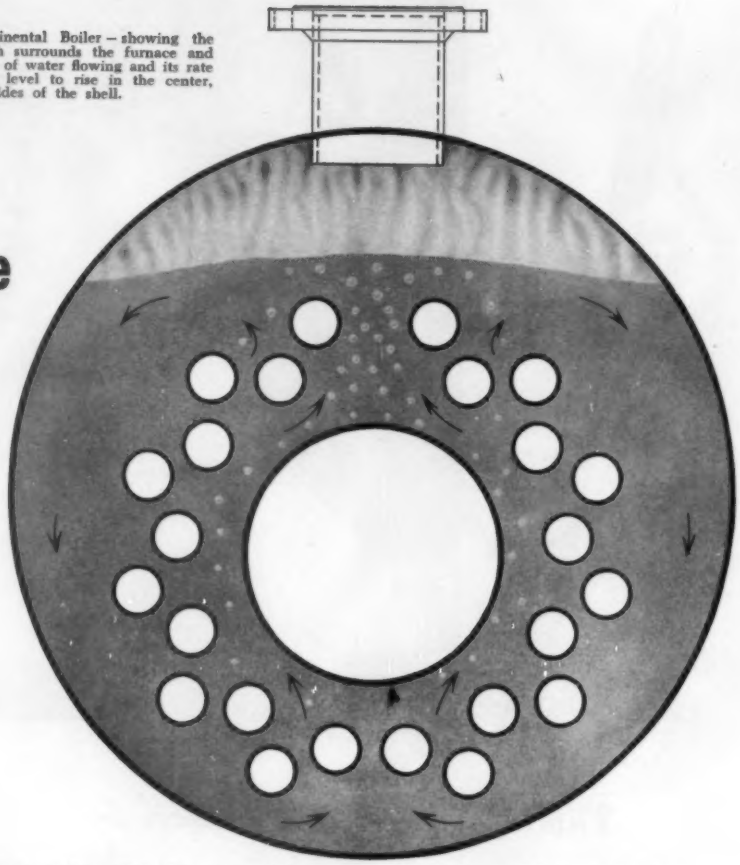
Strong claims? You can prove them for yourself by testing Rome Synthinol 901 in your own plant or laboratory. It's made for conditions that are death to ordinary electrical wiring.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

For more facts circle 560 on Reply Card

Cross-section of a Continental Boiler – showing the free flow of water which surrounds the furnace and return tubes. The volume of water flowing and its rate of flow cause the water level to rise in the center, then fall away to both sides of the shell.



What makes the Continental Boiler last longer... makes steam cost less

If you were to design a packaged boiler, water circulation would be a basic consideration because . . .

. . . poor circulation can cause overheating . . . can cause unequal stress in metal heating surfaces . . . can promote pitting and scaling on metal surfaces exposed to water . . . and can result in higher stack temperatures, decreased boiler efficiency.

But the many owners of Continental Boilers have had none of these troubles. Here are two special reasons why:

1. Two-pass design provides even flow of combustion gases to all heating surfaces.

Heat is thus distributed evenly to the rear tube-sheet and to all of the return tubes. Water is heated uniformly, and natural, balanced circulation results.

If high temperature combustion gases were to enter only one section of the return tube bank, the tubes in that section would be at a higher temperature, would be doing more work than the balance of the tube-sheet and return tubes. The result: water surrounding those cooler heating surfaces would have sluggish circulation.

2. Heating surfaces in the Continental Boiler are arranged so that there is a centrally located furnace and equal spacing of return tubes.

Of the total heat transferred to the water within a Continental Boiler, about 60% is transferred by the furnace. Thus it is essential that flow of water around the furnace be unrestricted. Note the area around and above the furnace and the open channel along both sides of the boiler shell. This design assures unrestricted flow of water around the furnace . . . facilitates rapid flow of water to the bottom of the boiler for reheating.

Uniform . . . free . . . rapid water circulation is an important reason why a Continental Boiler costs little to keep, has long service life, and makes steam cost less. For detailed information write for Bulletins BE-3, BE-4.

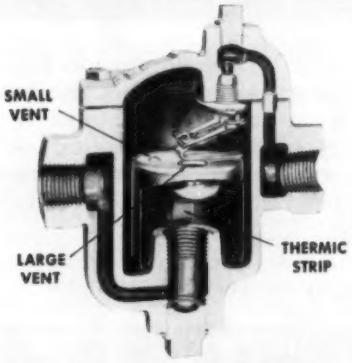
BOILER ENGINEERING & SUPPLY COMPANY, INC.

Phoenixville, Pa.

CONTINENTAL . . .
the boiler with the spinning gas technique

For more facts circle 561 on Reply Card

The Low Maintenance Trap for Low Pressure Heating . . .



Open Float and Thermostatic Trap

For fast heat-ups, Armstrong steam traps can be fitted with thermic buckets. These are excellent for heating systems that are shut off at night and turned on in the morning. Large opening in the bucket, controlled by a thermic strip, provides a fast discharge of air until steam enters the trap. Heat contracts the strip closing the opening. Non-condensibles that enter with the steam during normal operation are continually discharged through the small vent.

The Armstrong No. 800 trap above is operating at a 10 to 12 pound initial pressure and discharging into a return line carrying 5″ of vacuum. In 12 year's service, maintenance costs on this and 99 other Armstrong traps has been practically zero . . . so reports Mr. Thomas B. Healy, Vice President of the Liquid Veneer Corporation.

The reason behind this low cost maintenance lies in the design, workmanship and materials used in the traps. The stainless and chrome steel internal mechanism is identical in design, workmanship and materials to the internal mechanisms of forged steel traps used for 900 lb. pressure and 900°F service. It is no wonder that these traps deliver such long, trouble-free performance operating under the moderate pressures, temperatures and loads of a low pressure vacuum return heating system.

Low maintenance is only one of the reasons Armstrongs are widely used for heating. There are others . . . uniform heating . . . faster heat-ups . . . easy cleaning and inspection . . . guaranteed satisfaction . . . competitively priced . . . backed by a nation wide sales and service organization. Ask your Armstrong Representative for complete details or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

ASK FOR CATALOG J

. . . . . contains complete installation and service information, physical data and prices for all Armstrong traps and accessories.

Application Engineered

ARMSTRONG STEAM TRAPS

For more facts circle 562 on Reply Card

45 acres of fixtures at new Ford plant maintained at lower cost with UP-RIGHT Scaffold-on-wheels

This ALUMINUM ALLOY scaffold provides the most economical and practical means to maintain overhead equipment in any plant, large or small. A tower of any height desired is ready in minutes. Individual 1-piece sections are unfolded and set one on top of the other. They lock into place instantly . . . no tools, wing nuts or bolts.

Your maintenance costs can be reduced by UP-RIGHT SCAFFOLD-ON-WHEELS.

17-FT. UP-RIGHT TOWER SCAFFOLD ASSEMBLED IN 2 MINUTES BY 2 MEN

Note leg adjustment for uneven floor.
Ford Plant, San Jose, California

• *Write for descriptive circular* •

"UP-RIGHT" SCAFFOLDS

DEPT. 140 • 1013 PARDEE • BERKELEY, CALIFORNIA

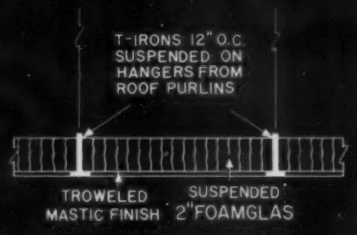
FACTORIES: BERKELEY, CALIF. AND TETERBORO, N. J. • OFFICES IN ALL PRINCIPAL CITIES

For more facts circle 563 on Reply Card

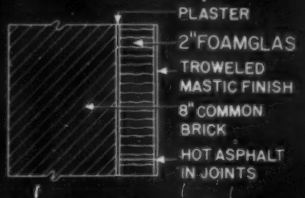
For more facts circle 564 on Reply Card ——→

DOUGH ROOMS (90°F-90%R.H.) AND COOLERS (35 to 40°F)

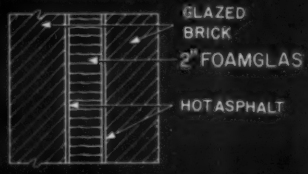
TYPICAL SECTIONS



TYPICAL SUSPENDED CEILING SECTION



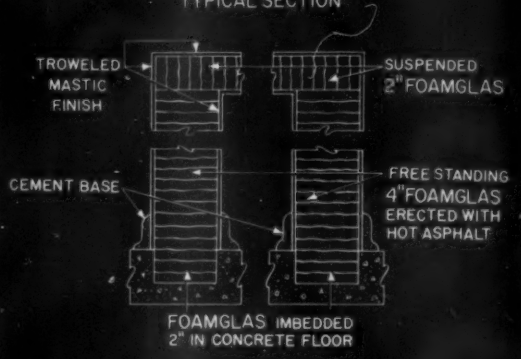
TYPICAL WALL LINING SECTION



TYPICAL COREWALL SECTION

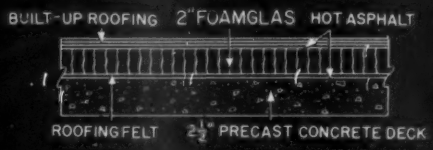
ICING TUNNEL

TYPICAL SECTION


TROWELED MASTIC FINISH
SUSPENDED 2" FOAMGLAS
CEMENT BASE
FREE STANDING 4" FOAMGLAS ERECTED WITH HOT ASPHALT
FOAMGLAS IMBEDDED 2" IN CONCRETE FLOOR

ROOF

TYPICAL SECTION



Architects and Engineers: Skidmore, Owings & Merrill, Chicago
General Contractor: George A. Fuller Co., Chicago
Insulation Contractor: Industrial Products Co., Inc., Chicago
Roofer: Brown & Kerr, Chicago

Only moisture-proof FOAMGLAS can effectively insulate all these for United Biscuit . . .

hot, humid dough rooms . . . coolers . . . icing tunnels . . . roof

K. F. MacLellan, president of United Biscuit Company, tells how they benefited from the unique properties of FOAMGLAS insulation at their Sawyer Division's big new plant in Melrose Park, Illinois:

"To insulate the walls of dough setting rooms kept at 90° F.—90% relative humidity *and* coolers kept at 35 to 40° F. we picked FOAMGLAS. It stays completely dry, fully efficient in both locations to help control temperature and humidity. Also it is inorganic and doesn't support vermin life . . . that's particularly important, of course, in all food plants.

"The extra rigidity of FOAMGLAS enabled us to suspend it between T-irons to form dropped ceilings. That's cutting our operating costs by reducing the volume of air to be heated or cooled. Its unusual strength enabled us to erect free-standing tunnels in which we harden freshly applied cake frostings. The elimination of structural supports reduced construction costs."

Mr. MacLellan concludes: "We also insulated the entire roof area with fireproof FOAMGLAS. No other insulation could have given us such effective results on such diverse, difficult applications."

Find out today how *you* can save by using FOAMGLAS. Write for your choice of booklets on insulation for buildings, cold storage spaces, piping or equipment.

Pittsburgh Corning Corporation

Dept. PE-75, One Gateway Center
Pittsburgh 22, Pennsylvania
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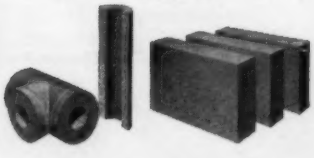
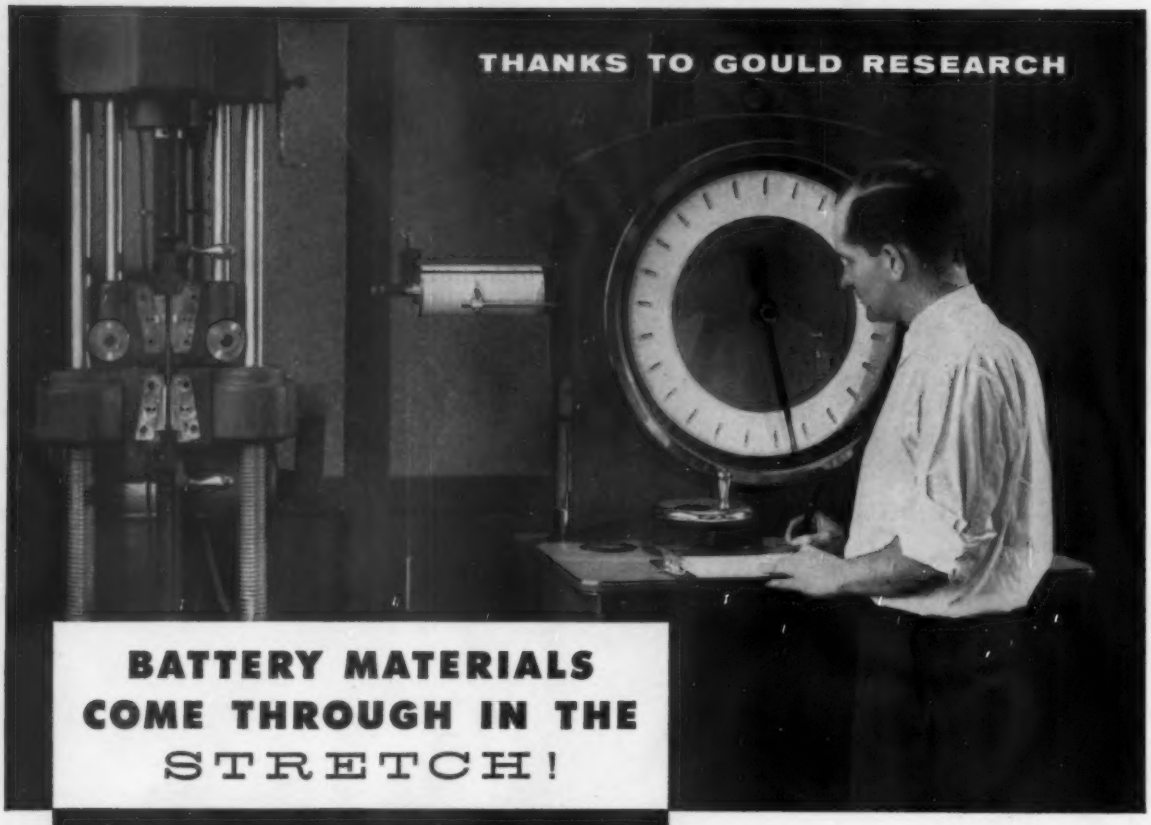
FOAMGLAS®

the cellular, stay-dry insulation





BATTERY MATERIALS COME THROUGH IN THE STRETCH!

BIG REASON WHY YOU GET MORE DURABLE BATTERIES FROM GOULD

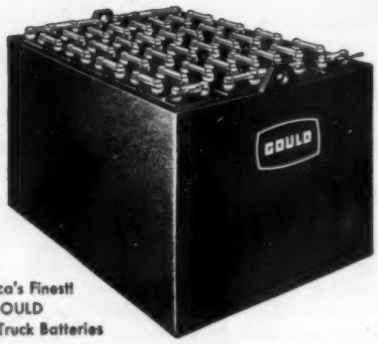
Shown above is a tensile strength testing machine in the Gould Battery Research Laboratory at Depew, N.Y. It is capable of exerting a pull of 10,000 pounds on any material. Gould uses it to make sure that every component of a Gould Battery—grids, connectors, posts, jars—has strength and ruggedness far above required standards.

Thanks to this and many other instruments of research, Gould Batteries are capable of delivering better performance under any conditions of service.

For the full story on Gould Research, send for Booklet 749.

"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries



America's Finest!
GOULD
Industrial Truck Batteries

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Batteries

GOULD-NATIONAL BATTERIES, INC.
TRENTON 7, N. J.

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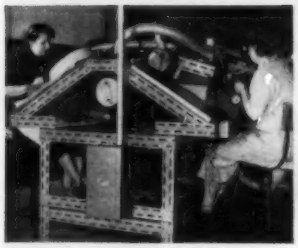
frame it with DEXION!

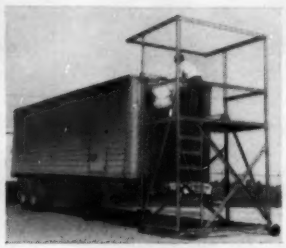
New "DO-IT-YOURSELF" framing material has scores of applications in your plant

TESTING BENCH

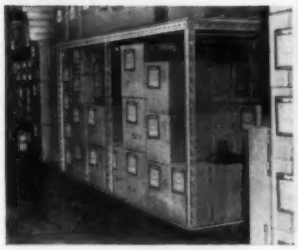
STAIRWAY



WORK BENCH



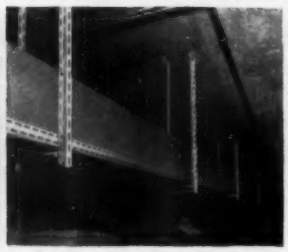
MAINTENANCE PLATFORM



STORAGE BINS

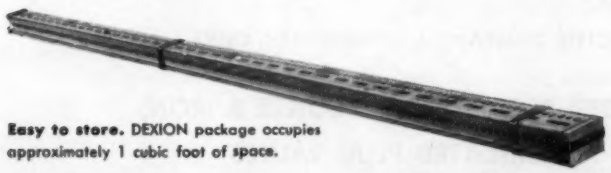
MEZZANINE FLOOR

GOODS CART



FRAMEWORK CONVEYOR

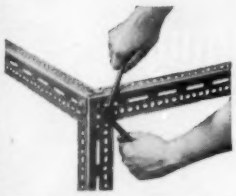
DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".



Easy to store. DEXION package occupies approximately 1 cubic foot of space.

Here's why you'll want DEXION Slotted Angle over any other framing material

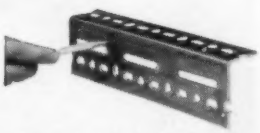
Anyone who can handle a wrench and a saw (or Dexion Cutter) can build with this precision-made, galvanized steel angle. And DEXION is so easy to use or re-use! There's no drilling—no welding—no waste. DEXION is strong and rigid—lasts a lifetime—and the price is amazingly low.



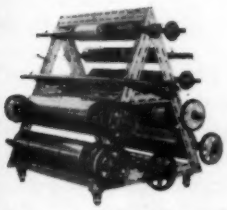
Simple to connect. All you need are two wrenches. No special parts—no training necessary.

Easy to cut. One down-stroke of DEXION cutter saves time and work.

Re-usable. You can dismantle and rebuild into other equipment.



Easy to measure. Diamond-shaped cutting marks spaced 3" apart.



Strong and rigid. Will support many hundreds of pounds.

DEXION panels. Available for shelving to support heavy loads.

You name it—DEXION will frame it!

Get the exciting new DEXION IDEA BROCHURE, which gives you full information—and shows what scores of manufacturers are building with this amazing framing material. Write direct to the address shown below.

DEXION DIVISION

ACME STEEL COMPANY

ACME STEEL

Dept. 7C, 2840 Archer Avenue,
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Hardened, Honed Seats

for tough throttling service

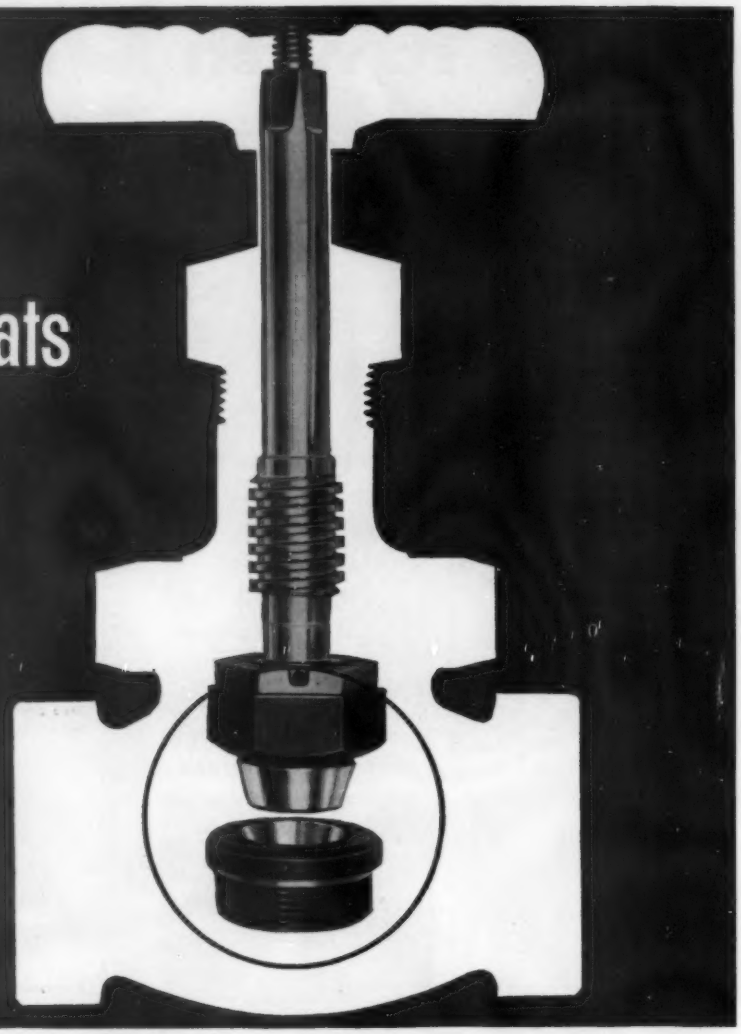

Fig. No. 558, bronze globe valve, 200 lbs. WSP, @ 550°F., 400 lbs. WOG, non-shock

A plug-disc and seat so hard they can crush scale between them and still close tight. A stem that absolutely will not gall or seize. The combination is in a rugged bronze valve designed for tough throttling service . . . the OIC 558!

Both plug-disc and seat are stainless steel, heat-treated to more than 500 Brinell hardness. Their seating surfaces are ground and *honed* to an accurate, smooth, bearing finish. The stem is OIC *alloy-40*, a sturdy bronze which won't gall or seize.

Remember, in throttling service a valve's stem, plug-disc and seat must withstand the most abusive wear. Rely on the toughness designed into this OIC line to give you extra-long service. Specify the modern 558 where you need bronze globe valves for throttling.

Write for Form No. 1001 which describes this valve along with the entire OIC 500 line, including composition disc and spherical disc globes, angles and check valves.

Call your OIC Distributor.

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

P-507

VALVES | **FORGED & CAST STEEL, BRONZE & IRON, LUBRICATED PLUG VALVES**

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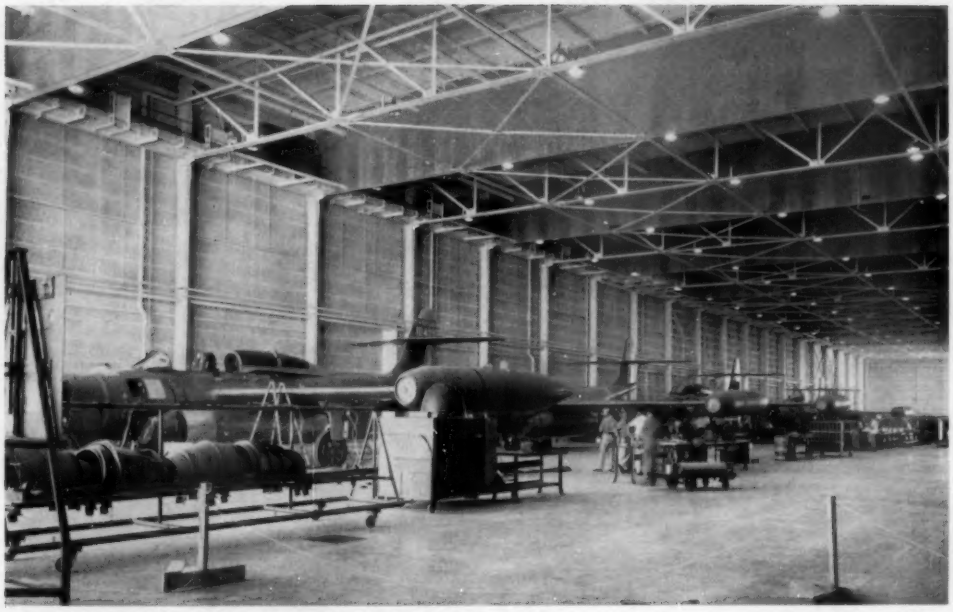


Fig. 1. Interior of the main hangar at Northrop-Palmdale shows the type of overhead lighting, the cat walks in the trusses at the far upper left in picture and the F-89D Scorpion final assembly line

Halt "Galloping Obsolescence" At Northrop's Palmdale Facility

Plagued by the same problem facing most aircraft builders, installations which are outmoded long before they're outworn, Northrop decided to do intensive planning on this new plant so it would still be a profitable facility many years from now . . . this building is the result

By E. R. PETOSKEY, Assistant Plant Engineer and Facilities Coordinator and KEITH WEISLEY, Supervisor, Program Planning, Northrop Aircraft, Inc.

PLANT PLANNERS and builders, turning their backs on hackneyed traditions of the building craft, have joined the U. S. Air Force's defense team, using their skills to produce "forward look" structures expected to remain modern for decades to come.

Monuments to the architects' skill have taken shape in recent months on the desert floor at Palmdale, California, site of the Air Force's new test center. These monuments are functional new buildings designed to house the research and production work of the new Air Force installation. For the first time, careful planning on a broad "master plan" scale has been employed to defeat the "galloping obsolescence" prevalent in aviation facilities.

Exacting demands of modern aircraft design and manufacture extend into the buildings where planes are developed and built. Few aircraft plant buildings erected 30 years ago still serve their purpose. Plants erected originally for manufacture of fabric-covered stick-and-wire planes haven't been easily adaptable to large scale production of high-speed fighters or bombers with their large size, complex interiors and massive construction.

Engineers of Northrop Aircraft's industrial and plant engineering department, setting out to design a multi-million dollar facility at Palmdale, faced squarely up to this problem of galloping obsolescence.

In a serious effort to provide facilities that would withstand the requirements of at least the next 20 years of aviation achievement, Northrop's industrial engineers have incorporated many unique features in a plant that today is one of America's most modern aircraft manufacturing installations.

Drawing a bead on the requirements to be expected 20 years from now is not easy. There are prospects of nuclear powered aircraft by then. Wider use of rocket power also appears likely. Jet engines will become more powerful and louder.

Along with new engine developments will come new types of structural materials capable of withstanding the rigors of high speed flight and the wracking strains of high altitude operation.

Coupled with the problems of undefined future requirements were the unusual climatic conditions peculiar to the desert area surrounding Palmdale.

Yearly temperatures range from minus 10 F to plus 120 F with 24-hr period variances up to 70 degrees. The

Fig. 2. This is the control center for the advanced fire protection system. It consists of a combination fire and watchman system which controls watchman delinquency besides alerting fire defense units. Unit prints conditions on tape

wind norm is 15 to 20 miles per hour with a range up to 100 miles per hour, accompanied by a high percentage of sand and dust particles.

Primary and initial purpose of the Northrop-Palmdale installation was to provide flight test facilities for Scorpion F-89D all-weather interceptors and prepare them for acceptance and delivery to the U. S. Air Force. Secondly, it was anticipated a growing amount of final assembly work would be performed there.

Completed in mid-1954, the Northrop Palmdale installation provides some interesting answers to industrial engineering problems in the aircraft industry.

The 250,000 sq ft Palmdale plant is located on a 227-acre parcel of land. Included in the facility are a three-story main hangar, measuring 550 by 340 ft, a painting and stripping facility and four smaller structures. The main hangar includes three stories of air-conditioned office space and a large air-conditioned radar test section.

One of the major concepts in planning a facility of this nature away from residential areas was to combat the jet engine noise problem. Therefore, this entire facility was designed to baffle the noise well into the future. This was accomplished by placing buffer zones within Air Force property in which building is limited to within 500 ft from any company property line. In addition, an area one mile wide on the periphery of the property was zoned for five-acre plots to be used for agricultural purposes only and allowing one resident per plot.

Utilities design includes readily expandable water, sewage disposal, power and communication systems.

The Northrop facility has been integrated with the USAF master plan for Palmdale. The isolated location of the base solves the numerous problems of noise and flexibility of operation encountered in the densely populated Las Angeles area. Yet, it is less than two hours by automobile from Northrop's home base.

All land, building and improved area planning follows a USAF mobilization day schedule. USAF building design criteria for Northrop-Palmdale required:

1. All high bay areas to have minimum span of 150 ft with 40 ft clear height.

2. All high bay trusses capable of carrying 15 ton monorail system at center panel point or 7½ ton bridge cranes, 50 ft span, at all panel points.

3. All floors above ground to be designed for maximum of 100-lb per sq ft, live load.

4. All ground floor slabs and flight ramp concrete to be designed to a required minimum flexural strength of 585 psi at 28 days.

5. Lighting: a. Assembly—30 to 35 foot candles maintained; b. Fabrication—40 to 50 foot candles maintained; c. Office and Lab—90 to 100 foot candles maintained.

6. Building exteriors to be standardized by use of Robertson "Q" Panel or equivalent.

Due to the urgency of the project and critical delivery of controlled structural steel shapes, the steel structural designs were engineered and placed for fabrication and erection bids within six weeks of award of engineering design contract. Buildings had to be located and construction started prior to design of location plot plan for all utilities, i.e., water, sewage, power, communications, etc.

Design and construction methods encompassed several innovations necessitated by the magnitude and unique character of the project.

Expansion Without Disturbance

To accommodate future aircraft, building column lines and exterior coverings in the main hangar were designed to permit economical expansion of the building without disturbing existing structures.

Steel framing was of riveted fabrication for ease in hauling approximately 90 miles from the fabricator to the plant site. Only 24,000 field rivets and high shear bolts were required in erection operations. In six weeks, 1,800 tons of steel were erected.

Due to the location of the plant along the San Andreas fault line, seismic load problems were solved by designing all multi-floor strucutres as independent floating structures within the main building.

Column to truss connections were designed to aid in fabrication and erection by coordination between steel fabricator and architect-engineer.

Concrete ground floor slabs were poured by transit mixers and finished by mechanically driven rodding machines in order to reduce finishing time and labor.

All office floors (concrete) are equipped with 3-duct floor ducting covering 120-volt convenience outlets, telephone outlets and public address system.

Due to the 40 ft clear height of structure, the major area was designed to a three-floor level with all mechanical and electrical equipment placed on a fourth floor in the truss area.

All Round Insulation

The character of production flight as well as assembly operation activity, coupled with climatic conditions, required that the buildings be insulated for noise as well as heat and cold. Use of metal siding in sandwich construction would have acted as a sounding board. Therefore, a separate insulating material—Insulrock—was used. This has reduced both noise and heat loss.

To combat similar conditions applicable to the roof, Celotex slabs were installed on metal decking, covered with composition roofing and painted aluminum finish.

Vermiculite plastered, 4-hour fire walls separate the high bay area from other activities.

The entire Northrop improved site is protected by one of the most advanced fire protection systems obtainable. This system, manufactured by Auto Call, consists of combination fire and watchman boxes equipped with plate glass and key for manual fire alarm, night watchman's clock punch and telephone for inspection and emergency call system. The telephone system is a two-way system using a red light for notification. Each valve has a tamper-proof switch, each riser has a water flow alarm and all outside valves have tamper-proof switches and alarms.

This entire system is tied into a console located in the plant protection department. This console does everything but talk. All alarm, watchman and protection devices record their condition in words on tape in this machine, which is also equipped to allow for personnel error. Should the operator be away from the board, fall asleep, have an accident, etc., the machine automatically prints "delinquent." The operator on duty must continually acknowledge his presence on the machine. If he is delinquent for a period of one minute over his required response, an alarm sounds.

All of the sprinkler systems not only record water flow condition but also give out an audible coded alarm. The audible alarm is used to call volunteers to aid in any fire. Our fire department is set up primarily for airplane flight operations rather than building protection. However, the fire equipment based at the facility and the manpower required to man equipment are multi-purpose and are capable of handling any type of fire or emergency.

Fig. 3. This is the radar laboratory. Light intensity of from 90 to 100 foot candles is maintained in this section where the radar equipment for the F-89D Scorpion fighter is assembled and inspected prior to its installation in the plane

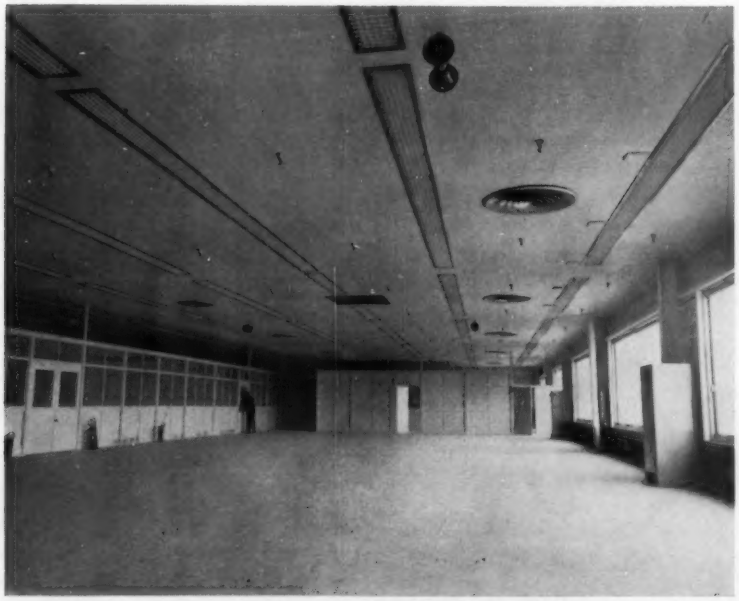


Fig. 4. Concrete ground floor slabs are being poured and finished midway through the plant construction phase

Special attention was given to designing for lower maintenance cost. For instance: catwalks in trusses service all overhead equipment items; power sub-stations were installed as units, using 11,000-volt primary and 277/480-volt or 120/208-volt secondary; all high bay lighting installations used 277-volt, color corrected, mercury vapor lamps, 1000 watt; power outages, emergency lighting and power outlets throughout building and ramp area are controlled by a 175 kw emergency generator with eight-second cut-in coverage.

Buildings are blackout type with windows in Radar Laboratory only; all furniture is steel.

Air conditioning and ventilation required a combination of installations. All offices, laboratories and guard houses are air conditioned; office and laboratory areas by mechanical refrigerant, all other areas by water spray desert coolers. Production areas, due to roof height of 55 ft average, are provided with mechanical ventilation providing eight complete air changes per hour. The paint and strip operation building has combination heat and air ducting equipment and a zoned exhaust system. Previous experience indicated heating, ventilating and exhausting as the main problem.

Items of general interest include offices and laboratory ceilings treated with acoustic tile; color dynamics throughout building areas wih blue, green, rose and yellow as the basic color combinations; hangar type doors mechanized with motor driven, drive and pull chain, operation; paint and strip, production high bay and radar installation areas protected with deluge, dry type sprinkler system, all other areas with normal wet type.

Design and planning of Palmdale provide for expansion to readily accommodate the increases in production increments, airframe dimension, power and speed, weight and performance characteristics and noise problems to be encountered as indicated by aircraft trends for years to come.

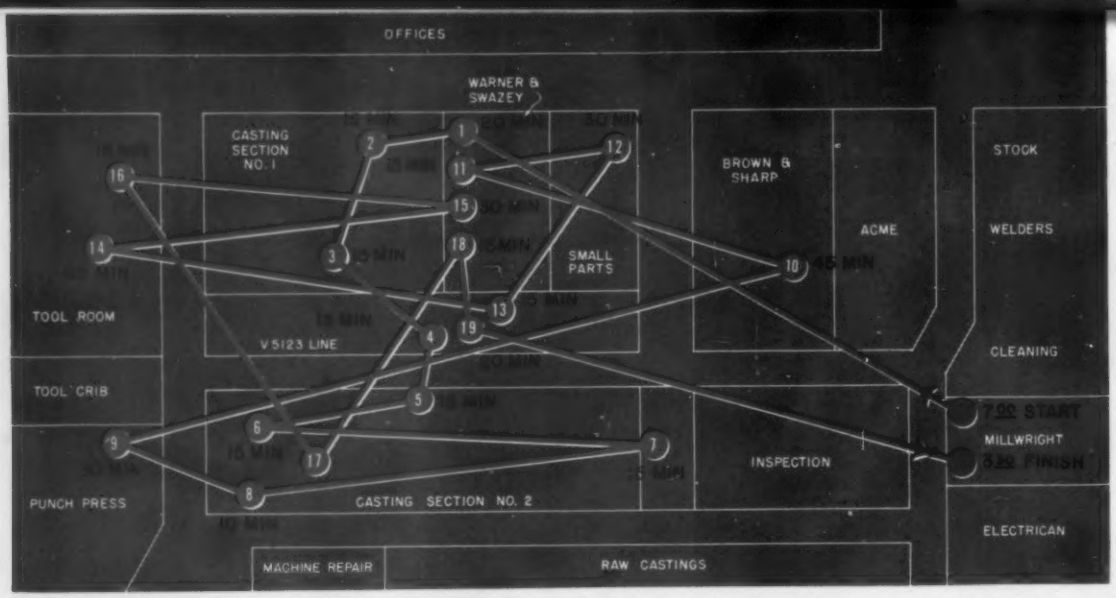


Fig. 1. This is a reproduction of one of the early working charts showing rounds made by a lube man at the Gardena plant of Minneapolis-Honeywell Regulator Co. This was the basis for the "by-the-clock" lubrication system now followed

How Planned Lubrication Helps M-H

It's Even Changing Their Plant Layout

SCHEDULED LUBRICATION has new meaning—new dimension—at Minneapolis-Honeywell Regulator Co.'s Gardena, Calif. plant.

By "scheduled," Minneapolis-Honeywell means a pre-planned and charted lubrication route. Where, in some plants, the oiler "wanders," at this plant he tracks a plotted course, oils the same machine precisely every day — five days weekly — if the schedule calls for it.

"Planned route lubrication" has: (1) allowed a single maintenance oiler to tend some 400 machines, do the job in eight hours, with time left for minor repairs; (2) eliminated oiling overtime; (3) vastly increased lube efficiency; (4) dove-tailed routine lubrication into production; (5) saved thousands of production hours because no longer do operators lube their own machines.

"Planned routing" in brief: a regimented lubrication program which maximizes lube efficiency, assures there'll be no missed machines, and more importantly, redefines "lubrication" in terms of a plant's individualized production.

Planned route lubrication goes a step further than the usual scheduled lube program. Minneapolis-Honeywell machines are lubricated in accordance with manufacturers' specs and lubrication engineering's recommendations. But then, so are machine tools in many other plants. The difference? Beginning at this point, Minneapolis-Honeywell plans its daily oiling routine to fit its specialized production.

It boils down to a truism: even though certain lubrication ports, on say a turret lathe, need oiling but once daily, the exact time of that daily operation is important. Perhaps the machine begins a steady 8-hour grind at 7 a.m. The ordinary lube formula says "oil once daily." In most plants the oiler may not reach the machine until noon. And tomorrow he may not get around to it until 3 p.m. At Minneapolis-Honeywell, such high production tools are oiled first thing—even before they begin production. And during *every* production day they're oiled precisely at 7 a.m. If, through use-history, it seems necessary to recheck oil reservoirs four times daily, those reservoirs are looked into at precisely the same times each day.

Fig. 2. Plant Engineer Burke W. Wombacher—for him, when it came to lubrication, a stop-watch on operations

Result: since the program's inception almost 12 months ago, not a single machine tool has registered down-time due to faulty lubrication.

What can Planned Route lubrication mean for your plant or machine shop? It can mean savings in time, material and production. And, perhaps for the first time, it can make maintenance oiling a precision operation—for the sake of machine longevity.

Minneapolis-Honeywell believes that "frequency" alone is *not* enough. More important: *time* of that frequency. There's a precise right-time for lubricating any machine in your plant—and that right-time is closely tied to your own production schedule.

Admittedly, pre-planning lubrication by the clock for every machine takes some doing—but the effort's rewarded.

Consider the M-H case history: back in April, 1954, the plant's management huddled. Conferencing were E. M. Toussaint; general manager; Burke W. Wombacher, plant engineer; machine shop super, A. B. Carpenter; operation's manager S. C. Bixby and maintenance engineer Paul Heger. Their problems were many: (1) routine lubrication was the responsibility of machine operators; (2) machine breakdowns were increasingly frequent; (3) non-routine oiling/greasing—handled by plant engineering—was often an overtime chore, the lubers coming in early of a morning or working weekends.

ALEMITE COLOROUTE PLAN

LUBRICATION ANALYSIS
FOR
Minneapolis-Honeywell Co.
17300 Western Avenue
Gardena, California

MACHINE Turret Lathe
MANUFACTURER Warner-Swasey
MODEL #1 MFG. NUMBER SIZE
FACTORY NO. 0100 PLANT NO. BUILDING
DEPARTMENT Small Parts MISC.

NO	POINT OF LUBRICATION	COLOR	FREQUENCY	CODE
1	Air Line Oiler	Green 1	Daily	
2	Sight Feed Oilers	Yellow	Daily	
1	Bellows Ram Cheeks	Bellows Red	Weekly	
1	Grease Fitting on Cutting Oil Pump	Red	Weekly	
6	Grease Fittings on Head Stock	Blue	Weekly	
3	Grease Fittings on Carriage	Blue	Weekly	
1	Oil Hole Turret	Green 1	Bi-Weekly	

CODE: EACH SHIFT · (3) DAILY · (1) BI-WEEKLY · (11) WEEKLY · 2 WEEKS · MONTHLY · 3'RD MONTHS · YEARLY

SUGGESTED MAINTENANCE SCHEDULE FOR OIL RESERVOIRS, GEAR CASES, HYDRAULIC SYSTEMS, RING OILED BEARINGS, LUBRICATION FITTINGS OR DEVICES

Fig. 3. This is one sheet of the Coloroute plan, basis for the pre-planned and "by-the-clock" lubrication system at M-H that is even changing the face and figure of the plant

Fig. 4. The lube man finds he is right on time as he checks his watch. The specially-designed cart is so equipped that it needs no filling during 8-hr shift, sometimes not for 24 hr

Management did some figuring. It determined that machine operators in lubing their own machine tools, each needed about 15 minutes daily for the job. Multiply that by 400-plus operators and the lost production time grows astronomical. Secondly, too many machines were being improperly lubricated.

So Minneapolis-Honeywell called in Alemite's engineers, adopted the Alemite Coloroute Plan as a first step in revamping lubrication (and to protect some $4 millions worth of precision tools). Secondly, it assigned a full-time oiler to the shop's machine tools, handed plant engineering the oiling-greasing routine (electrical components—motors, generators, etc.—are handled by a different maintenance lube-team). So far, however, the program was strictly "standard". Machine lube ports were coded to show frequency and type of oils/greases to be used, this in accordance with the standard Alemite system.

But something new was added: the "route" concept.

Plant Engineer Burke Wombacher had much to do with spelling out the plan's specifics.

Said Wombacher, "For every machine in the shop, there must be a precise 'right time' for lubrication . . . that is, some span within half an hour or so during the production day when each machine should be greased and oiled."

Merely lubricating a machine "daily" wasn't enough. The point was —"*when* during the day."

To find out, Minneapolis-Honeywell's management called in its supers and foremen. Sitting around a conference table spread with a machine-tool plot plan of the entire shop—a plan showing machines by their Minneapolis-Honeywell numbers — foremen began by discussing *use*. When, on an average, did machines under their care go into production? What were the hours of peak load? When, from their own observation, did they believe departmental machines most needed lubing?

Route Planned

The foreman in charge of turret lathes, for instance, said his machines needed lubing immediately at start of production. Another foreman said his less-used machines hit peak production in mid-morning. And so it went. From this *use* discussion, Plant Engineer Wombacher and Maintenance Engineer Heger roughly sketched a lube route plan—beginning at 7 a.m.—from one plant department to another. There was some backtracking, but this couldn't be helped. The finished plotting was anything but a straight line. It zigged and zagged—but it got the oiler to departments *when* and precisely when—they needed him.

Next, the plan was given a 30-day test. The oiler was told the departmental sequence of lubrication, but how long he remained in each department was left to him (this was necessary so the oiler would have no preconceived notion of the number of machines maintenance expected—and estimated—he could tend). The oiler noted on a day-to-day chart the time he actually reached and worked each group of machines. He noted the number of machines he was able to lubricate. At first, the oiler complained that in a day's time he couldn't possibly lube all the shop's machinery. But the record proved otherwise. It proved, almost unbelievably, that he could wind up his work in just over 5 hours —leaving him an extra two hours, at least, for non-routine lubrication chores. This alone was a "bonus", assuring plant engineering that it was on the right track.

With 30-days' routing-time charts before him, Burke Wombacher was able to lay out a route with real precision.

Let's draw sharper focus here. Wombacher, studying the oiler's 30 route charts and noting the times he'd arrived at a department, the time he needed there and his time of departure for another machine group, was able

Fig. 5. Maintenance Engineer Paul Heger, left, and lubrication man check over route chart before the lubrication man goes on to complete his day's journey

to formulate a precise route. For example, the oiler's own time schedule revealed that 17 days out of 30 he'd lubed 15 machines (drill presses, turret lathes) in the Casting section during the fifteen minutes between 7:30-7:45. This, too became "standard" in M-H's planned route. And remember, the oiler's visits to these departments tied into the foremen's evaluation of actual lubrication needs, as they dovetailed into production.

So the route-plan was drawn up. During the five hours in which the oiler reaches some 300-400 machines, he administers their "daily" lubrication. For some machines, notably turret lathes, he may return three or four times a day to check reservoirs. During those extra two hours (12:10 to 2:00 p.m.), he does non-routine lubrication, that is, administers grease and/or oil according to the "weekly," "monthly" or every six monthly schedule. That is, lubrication other than "daily."

Other Benefits

This company's routing plan reveals some interesting findings: (1) it points the way to better machine placement. Already M-H has begun a number of departmental switches, tied to lubrication, thus ironing out some of the oiler's back-tracking as he revisits machines for the third or fourth time; (2) now plant maintenance knows precisely—by consulting a watch—where the maintenance oiler is working; (3) planned routing has strongly indicated exactly where larger reservoirs can reduce overall lube time by allowing machines to run longer between reservoir-fillings; (4) precise scheduling assures that no machine is missed.

Helping the oiler complete his route without delay is his mobile oil-grease cart. It's so designed and equipped as to need no filling during the 8-hour shift, and often can run two shifts before refill. The cart (on rubber wheels) contains: five oil reservoirs, 2 to 7 gallons; 10 squirt cans (five quart size, three ½-pint Plews, the rest two pint size); four 2½-lb grease guns. Cart containers are coded with standard Alemite Coloroute codes—matching machine lube port color coding.

Minneapolis-Honeywell has standardized on five basic oils and greases:

Color code	Lubricant type
blue	No. 33 General purpose grease No. 1
red	No. 38 Water repellant grease No. 2
yellow	General purpose oil
green	No. 1 Hydraulic oil SAE 10
green	No. 2 Hydraulic oil SAE 20

Thus, a yellow circle at a machine port means: "use general purpose oil (yellow) daily (circle indicates "daily"). Green circle overprinted with a "1" means "use hydraulic oil SAE 10 daily."

The M-H "Planned Route Lubrication" system demands that plant engineering constantly search for ways to reduce the frequency of lubrication because, as new machines are added, the burden becomes greater on the oiler. Thus, Minneapolis-Honeywell is installing larger reservoirs on many machines. Further, to let the oiler work faster, plant engineering is rigging feeder extensions to many lube ports—so the oiler may go about his lubing without bothering the machine's

(Continued on page 162)

Fig. 6. Lubricating machines while they are still in production has been one effective means of increasing machine's output and improving lube practice

Fig. 1. Banks of CO_2 cylinders are inspected weekly for broken seals, operating condition

Fig. 2. All control switches, lights and electrical equipment are in explosion-proof housings, eliminating danger of ignition from test fluids

Aero's Test Houses are Designed for Safe Fuel System Testing

By LON B. RHINES, Chief Plant Protection, Aero Supply Mfg. Co., Inc., Corry, Pa.

Fig. 3. Portable extinguishers located throughout plant are inspected regularly

BECAUSE OF THE hazards involved in testing fuel system components, we have found it pays to provide the laboratory technicians with modern testing facilities and equipment to protect them from injury.

In many cases, parts of a fuel system are tested to 300 per cent of service performance and, therefore, require pumping capacities and pressures in excess of basic requirements.

Prototypes to meet advanced designs in aircraft and missiles are constantly moving through qualification testing, making requirements for new and better testing equipment an ever-changing factor.

During the years of technical development of aircraft components, we have tried to maintain the most modern test laboratory devices, equipment and buildings to protect the worker.

All experimental prototypes must be tested with aircraft fuels of a highly explosive and inflammable nature. This makes such testing extremely hazardous to manufacturing personnel activities unless the test area is remotely located on the plant premises.

At Aero Supply all of the aircraft fuel system component test laboratories have been completely divorced from congested areas where a thoughtlessly lighted cigarette, a spark from passing motor vehicles or other outside factors could contribute to ignition of the testing fluids. Such carelessness could result in loss of life and injury to personnel or damage to valuable equipment and buildings by fire or explosion.

Safety precautions have been rigidly established for the test areas. The test buildings have been located in a restricted zone where only authorized technicians are permitted to enter.

Before entering this restricted zone each individual must check out all personal lighters, matches, cigarettes, pipes or any other items that could in any way cause ignition. Non-sparking tools must be used in making test setups. All electric wiring, switches, motors, etc., are enclosed in Underwriters' Laboratories explosion proof housings.

Each test house is constructed of corrugated galvanized iron and the

(Continued on page 162)

Oilless Bearings—

For Industry's Dirty Jobs

Article covers engineering characteristics of a bearing material consisting of special hardwood, impregnated with greases and waxes ...Actual applications are also cited

BEARINGS ARE SOMETIMES expected to perform under unduly difficult conditions and do a good job of keeping things going. They must operate in corrosive and wet surroundings, and in the presence of abrasives.

When conditions are such that other bearings cannot be successfully used, these requirements can be taken in stride through the use of an engineering material containing a special lubricant. This is a dense hardwood which is carefully selected and air-dried for a number of years. It is completely impregnated with a special type of lubricant which is solid at normal temperatures and flows due to the heat of friction. This material can be used in ambient temperatures that do not exceed 160 F.

Because of its great density, the material can be machined to close tolerances on metal-working machine tools. Bearings for conveyors are normally manufactured to an inside and outside diameter tolerance of plus or minus 0.002 in. and a length tolerance of plus or minus 0.005 in. Machining is performed after the blocks have been impregnated with the combination of greases and waxes.

Once the bearings of this material are placed in service, they do not need to be lubricated again. Addition of lubrication will impair the action of the special lubricant which is already present in the material. The lubricating film starts forming due to the relative motion between metal and the bearing material. As the speed and load increase, the film also increases. When motion ceases, this film of lubricant is re-absorbed into the wood preventing the oil from dripping. This type of bearing, therefore, is widely used in conveyors for the food and chemical industries.

Fig. 1. Conveyors operated by United Parcel in Los Angeles have oilless bearings akin to those used by firm in Philadelphia for 17 yr without replacement

Noise Elimination

An advantage of the characteristics of the impregnated hardwood bearings is taken in the elimination of noise in the screw conveyors. Because these bearings used in conveyor hangers need no lubrication, they can be run safely and silently, even at accelerated speed. In contrast to this, a lack of lubrication in hard iron bearings can result in an annoying squeal.

For example, in Carteret, N. J., management of Westvaco Chemical Div. of Food Machinery & Chemical Corporation was besieged by noise complaints from the neighbors. Squealing noises, occurring at odd intervals 24 hr a day, emanated from the screw conveyor that handles sodium carbonates. This problem was nicely solved through the use of lubricated

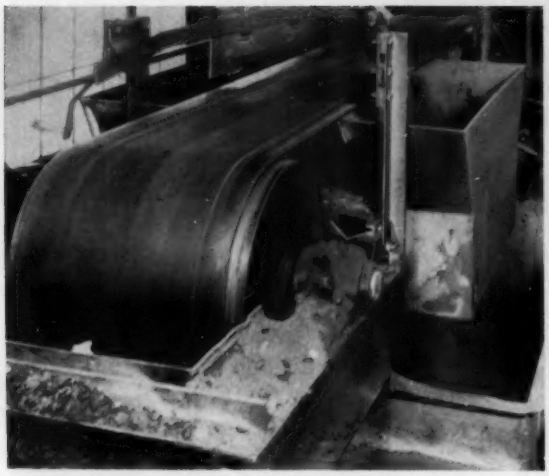


Fig. 2. Use of Arguto bearings in Dodge Steel foundry pillow blocks cut wear eight to ten times compared to metal bearings

Fig. 3. Blocks of bearing material sliding on rail (arrow) protect slats from bending by pulp impact at Scott Paper

hardwood bearings in the screw conveyor.

Most bearing materials undergo rather rapid wear when the material being conveyed is abrasive. The high resistance of this oilless bearing to abrasion is due to the fact that this material can pick up abrasive particles which are covered with the generated film of lubricant. The lubricant on the bearing surface tends to repel foreign matter. The small amount that reaches the bearing surface becomes imbedded in the wall and is covered with the lubricant film.

The Dodge Steel Co. of Philadelphia uses the impregnated hardwood bearings in the bucket elevator and belt conveyor systems that handle foundry sand, Fig. 2. Pillow blocks on the head and foot pulleys of the conveyor and the head sprocket of the elevator were equipped originally with bronze bearings. In spite of frequent lubrication, there was excessive wear. The change to Arguto bearings extended the life of the bearings from eight to ten times.

Conveyor Corrosion Test

One conveyor manufacturer designed and built a short section of a conveyor with bearings of the impregnated material and subjected it to a corrosion test, Fig. 4. The unit was buried in a pile of fertilizer for 90 days. After the conveyor section was uncovered, the hardwood bearings were found to be just as free as they were when initially installed. They were not affected by the ammonia and nitrates which normally corrode metallic bearings and eat through seals when seal bearings are used. This type of conveyor is now used by many firms that handle bagged fertilizer.

In the fishing industry too, these bearings make a good accounting of themselves. They are used, for example, in the roller conveyor on the receiving wharf of the Maine Fisheries Corporation of Portland, Maine. This conveyor carries fish from the boats to bins prior to filleting and quick-freezing, Fig. 5. Bearings are subjected to salt water, ice, and fish scales. After four years of service they are in excellent condition.

The hardwood bearing works well indoors or out, under dry, dusty conditons, even when submerged or subjected to water. However, the bearings will swell slightly after prolonged exposure to moisture. When operating conditions are known in advance, engineering allowances are made in the manufacture of the bearings to take care of the anticipated swelling in service.

Fig. 4. After 90 days in fertilizer, the special hardwood bearings in this conveyor section were as free as when installed

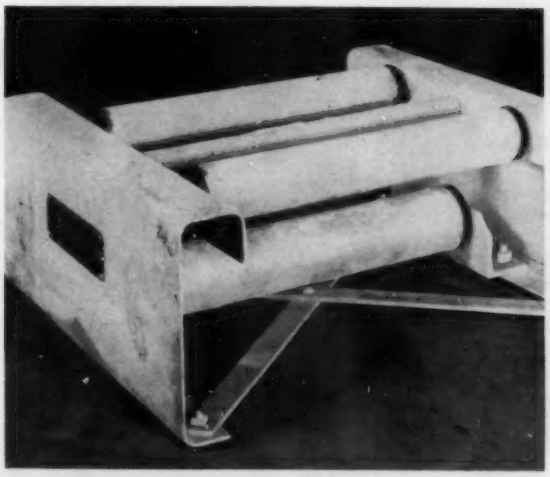


Fig. 5. Bearings in roller (arrow) are subject to salt water, ice, fish scales. After 4 yr service they were in good shape

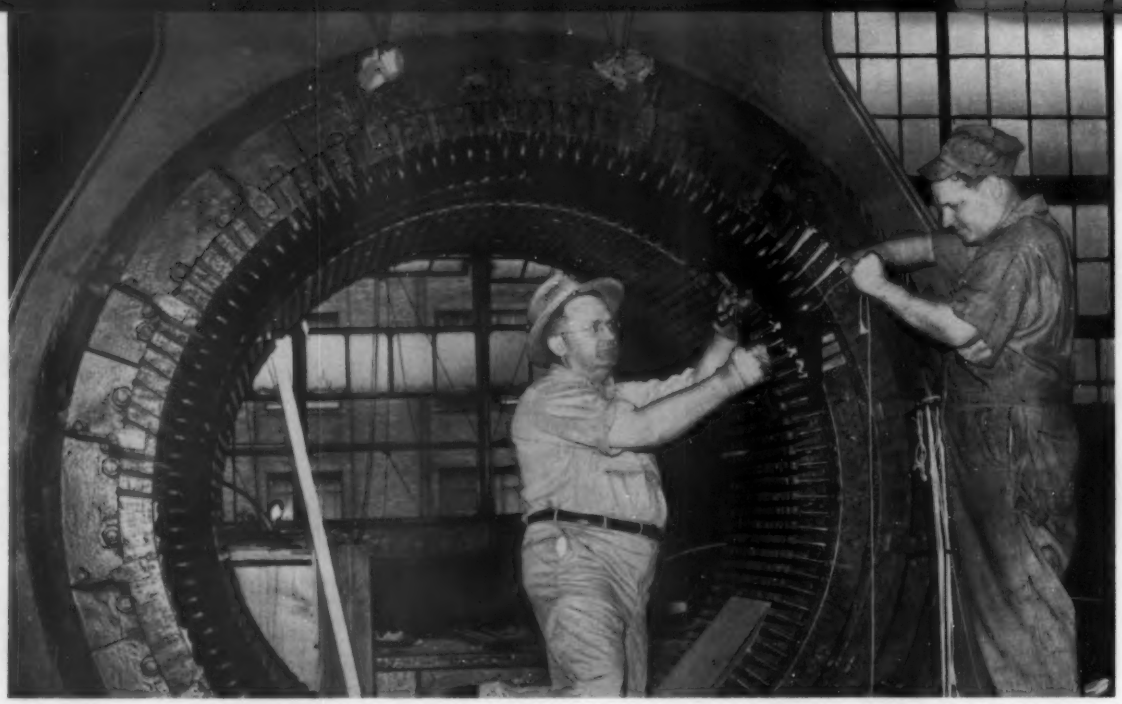


Fig. 1. Large electrical units are field-repaired; this rewind job on 4,000 kva synchronous condenser stator is an example

Motor Repairs In The Plant—
Mean Better Availability for Buick Production

PRODUCTION ACTIVITIES of each industrial worker in this country are backed by about 9.5 hp of electric motor effort. In some plants this figure is lower and in others such as in the Buick Motor Plant in Flint, Michigan, motor horsepower in the production department is much higher. Regardless of the harnessed productive power per man, a certain amount of motor equipment requires attention periodically in the form of repairs. This work can be handled with little difficulty in a small plant but where production relies heavily on electrical drives, motor repairs are a major undertaking.

At Buick, a motor repair shop that is adequately equipped and manned by qualified personnel takes care of such repairs. Motors that can be transported by plant handling equipment are brought to the shop; others are repaired in the field. The plant has over thirty thousand motors of 1 hp and up and many thousands of fractional hp units. These range from 1/150 to 2 thousand hp. In a recent month, for example, this shop handled repairs on motors totaling over 1300 hp. This cumulative figure consists of small units.

The shop operates under the immediate direction of the Motor Repair Foreman who is directly responsible to the Chief Works Engineer. The department operates on two shifts with a total of about 20 employees. The majority of the men have been trained in the shop; however, for its future labor supply the shop is relying strongly on the apprentice training system. Even though each employee in the shop is capable of working on any size and type of unit, some men specialize on fractional horsepower units and others on larger ones.

Benches assigned to individual workers are conducive to keeping the work well organized and prevent shop tools from being scattered and misplaced. Various devices are used in the shop to make operations more efficient and to make the work easier for the repair men. A steel table, for example, mounted on casters carries an insulation cutter and a special forming jig which quickly shapes the material to fit stator slots, Fig. 5. There are also several machines for winding coil groups on rotating reels. Many different sizes of coil winding fingers are kept on a visible rack to take care of the variations in coil requirements, Fig. 6. Other mechanical units do the job of twisting coils so that they can fit smoothly over each other after they are inserted in the motor slots. In addition to this, there is a dynamic balancing unit for checking rotors and armatures after they have been repaired, Fig. 4.

Before going on with a description of the shop operations, it might be well to find out how a burned-out motor, for example, gets down to the shop. The supervisor in whose department the ailing unit is located writes a Maintenance and Repair order along

Fig. 2. Degreaser helps coil stripping

Fig. 3. Air hoist comes in handy to pull old coils from stators

Fig. 4. Rotors are checked on balancing stand before assembly

with two copies. He sends the original to the electric motor department, keeps one copy and sends the other to his plant superintendent. After the repairs are completed, this form is returned from the shop office to the originator, who sends a move order to the shop, and keeps a copy of it.

The repair shop clerk keeps track of the labor and material expended on the motor repair on a special job ticket which remains in the office files. An expense requisition charging the material used goes to the accounting department. Labor time, of course, is picked off the individual time cards. Returning to the shop activities, we find that after the stator is separated from the rotor, it is suspended in a vapor degreaser. The solvent works on the insulation and helps make the coil removing job easier, Fig. 2. An air hoist equipped with a special type of hook is used to pull out the coil from the stator, Fig. 3.

After the stator has been rewound, it is taken to the varnish coating and baking area and is dipped in a tank by means of an electric hoist. Large units that cannot be handled in the tank are placed in a pan equipped with a pumping system for circulating the coating material around the conductors. The baking oven is electrically heated; the temperature in the baking enclosure is automatically controlled not to exceed 250 F.

Testing

On the average, a motor stays about two days in the shop except in the case of an emergency. Painting and drying takes a big bite out of the total repair time. The stator windings are given two coats of black varnish and take about six hours to bake each coat.

Prior to being put back to service, the stator is given ground and short circuit tests and a "phase-out" trial. To check the latter, a steel ball is placed inside the stator which is then energized through regular service connections. If the winding is properly connected, the ball will roll on the inside periphery of the stator. Otherwise it will stand still.

Electrical testing is done with the aid of a test panel located within the shop area. A transformer tap changing switch makes it possible to make insulation tests in either 500 v or 1000 v steps to a maximum of 10,000 v. Motor windings are ordinarily subjected to 3 times the service voltage. Besides this, the repaired motor is given a running test from two to three hours of continuous operation. A dynamometer is also available if additional testing is considered advisable. It is not used for routine testing.

Availability is the biggest advantage of repairing motors within the plant. In the case of emergency affecting costly production operations, the value of good shop facilities is obvious.

Fig. 5. Roving bench carries insulation cutter and forming jig

Fig. 6. Coils are reel-wound on metal fingers seen in the back

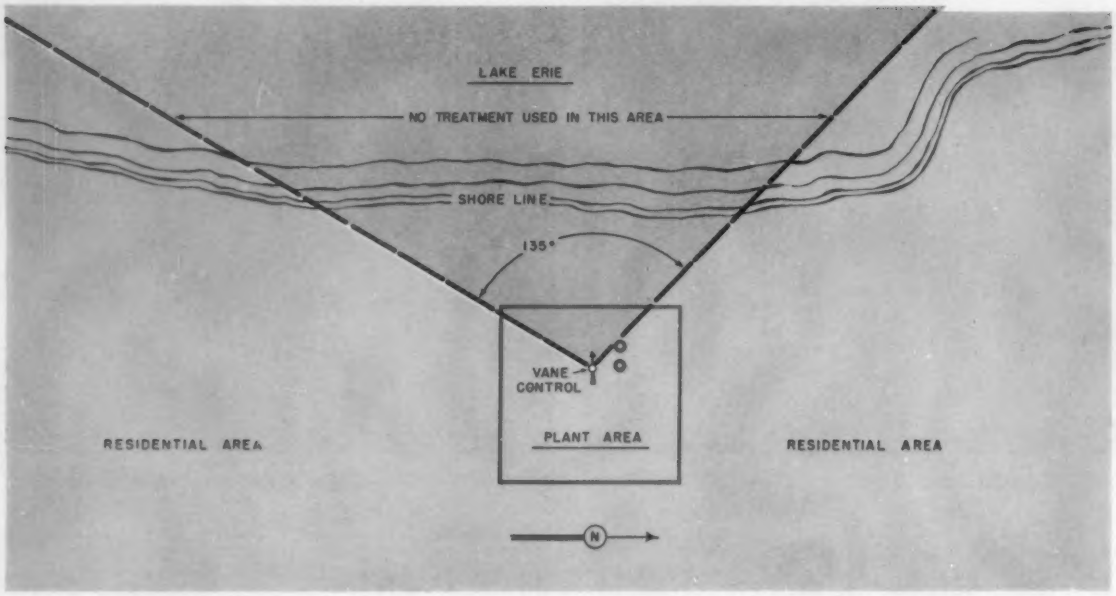


Fig. 1. Representation of area surrounding plant indicates extent of protection afforded by reodorant application

Stack Effluent "Reodorized"

Wind Direction, Velocity Analyzed for Control

By CLARENCE LAMOREAUX, formerly Chief Chemist, Federal Portland Cement Co.

INSTRUMENTATION has been applied to help control the kiln stack odor problem that results from the manufacture of Portland cement at the plant of the Federal Portland Cement Co., Inc., of Buffalo, New York.

The odor, often referred to as "hydrogen sulphide," is not exactly that, but a mixture of several odors, of which calcium sulphide is the most discernible.

To explain how the odor is produced in the Portland cement manufacturing process, a brief description of that process seems in order.

The raw mix is composed of approximately 75 per cent high grade limestone obtained from a northern Michigan quarry and 25 per cent of a blend of shale and clay. These materials are intimately ground together in a ball mill with about 33 per cent of water to form a slurry. The slurry is pumped to the rotary kilns where it is "burned" into Portland cement clinker. The two original rotary kilns, about which this article is written are 11 ft in diameter and 175 ft long, are mounted on a slope or "pitch" of ½ in. per linear foot of length and are rotated at a speed of 48 revolutions per hour. The production rate is approximately 3,000 barrels (564 tons) per day.

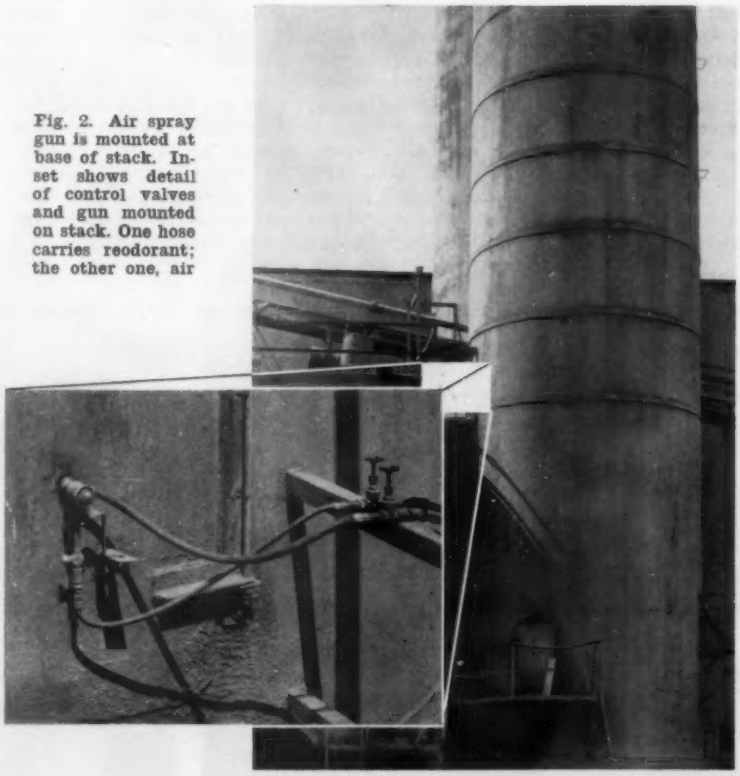


Fig. 2. Air spray gun is mounted at base of stack. Inset shows detail of control valves and gun mounted on stack. One hose carries reodorant; the other one, air

The "burning" process consists of pumping the slurry into the high end of the kiln where the material comes into contact with the exit gases of the kiln, which have a temperature of 800 F. As the material is moved forward by the rotation and pitch of the kilns, the material temperature is gradually raised until the material is about 30 feet from the discharge end where a hot zone of 2750 F to 2850 F is maintained. Here the raw materials are recombined into Portland cement clinker.

The temperature of the clinkering zones is produced and maintained by direct firing unit coal mills. Bituminous coal is used for heat. It is specially selected for a low sulphur content and a high thermal value.

Gases Scrubbed

The air necessary for combustion is supplied in part by the coal mill fan, which blows the coal into the kiln, and the remainder by an induction fan located at the rear, or feed, end of the kilns which draws approximately 75,000 cfm of gases through each kiln and discharges into a scrubber. Here, the kiln gases are washed with water to remove dust and any sulphur dioxide that did not get oxidized within the kilns. The kiln gases pass from the washers into the kiln stacks which were the point of concern, because of trace amounts of sulphides from coal and polysulphides from the raw materials which were noticed when atmospheric conditions were right.

Fig. 3. Vane is mounted on building adjacent to stacks, at height of 100 ft

The two original kiln stacks were made of concrete, 14 ft in diameter at the base and 10 ft in diameter at the top, and 205 ft high. Later it was found necessary, in the interest of safety, to reduce the height of one stack to 50 ft. Because of this loss of height, the gas from that stack reaches the ground before the others, and therefore is more concentrated.

The problem was not one of toxicity, corrosion, or paint discoloration, but an odor problem that existed under proper atmospheric conditions, within a half mile radius of the plant.

In an attempt to remedy the situation, the management became interested in a claim made by Airkem, Inc., for a product known as "Airkem," that would eliminate certain objectionable industrial odors.

Tests to determine the suitability of Airkem for our use were first started in the spring of 1952. The preliminary results were quite encouraging, although expensive.

A trial usage period was agreed upon and a Paasche automatic airbrush was installed on each stack to spray a fine mist of approximately three pints per hour of Airkem into each stack.

The control of the operation, as to when to turn it on and off, was left up to the mill foreman, or someone he designated. The results were not satisfactory, from a usage point of view, as well as cost.

Trial and Error Bring Results

A further study of the problem was indicated, and the following observations were made: First, the plant is located on the extreme eastern tip of Lake Erie and about half of our surrounding area is water. Second, when the wind velocity is such that the kiln stack effluent rises lazily upwards, no treatment of the gas is required. Third, the wind direction and velocity are not constant, but vary widely over a 24-hour period, so much so that efficient manual operation was not to be expected.

The answer was instrumentation. The requirements were given to the supplier of the counteractant, who in turn passed them to the Friez Instrument Division, Bendix Aviation Corporation of Baltimore, Maryland. The result was the "Vane-Control-Air", which was developed to meet our requirements. This instrument is an electro-mechanical device consisting of a wind speed and direction transmitter and a controller, which can be used for controlling a process or warning where wind speeds and directions are

Fig. 4. Control station, located inside building, triggers spray gun action

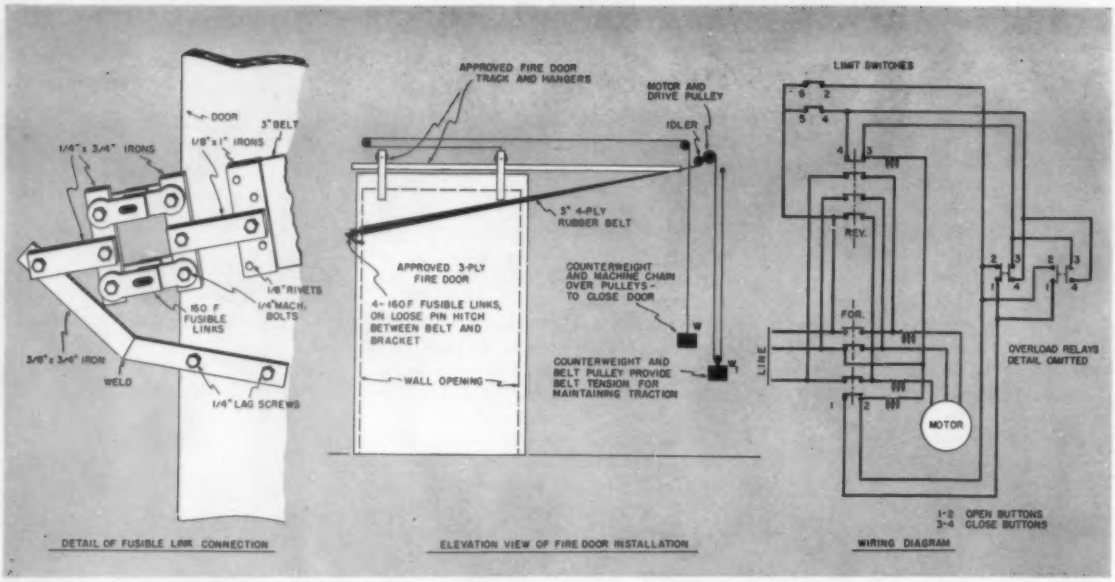
critical. After a trial and error period, it was found that we did not need stack gas treatment when the wind blew the gases over the lake, or when the wind velocity was less than 5 miles per hour.

The vane was mounted as near the stacks as practical, and 100 ft above the ground to avoid stray eddy currents near ground level. The transmitter is constructed so that the controller circuit is energized when the wind speed is less than a chosen value and when the wind is from a specified arc; or either speed or direction can be controlled independently. In normal use, however, both conditions must exist simultaneously.

In operation, when the wind is blowing gases towards the land area at a velocity greater than 5 miles per hour, the switch in the control panel is activated, which in turn opens the solenoid valve on the airline connected to the Paasche spray guns. The Airkem liquid is fed by gravity flow to the guns from a drum mounted inside the washer building. The Airkem will not flow past the air guns when the air pressure is shut off.

A time lag of 30 seconds was incorporated into the design by use of a time relay; this is to prevent excessive activation of the unit due to sudden gusts of wind, or change of wind direction. The solenoid air valve can be operated manually by a switch in the control box, which is located on the ground floor beneath the air valve.

The system has been in continuous operation for over a year and has proved to be very dependable and very satisfactory in its operation.



Sketch illustrates how the motor, pulley and weights were installed to operate the sliding door. This mechanism was relatively inexpensive to build and has required very little in the way of maintenance. Fusible link hook-up is at left

Simple Mechanism Operates Firedoor

Which Opens and Closes at the Touch of a Button

By J. G. ARMSTEAD and T. R. BUTMAN, F. C. Huyck & Sons, Kenwood Mills, Rensselaer, N. Y.

FOR SOME YEARS now we have been using a power-operated sliding door opener which was relatively inexpensive to build, has proven to require modest maintenance, and has given satisfactory operation.

It was important to have the door closed in one of our departments, except for frequent traffic, to reduce drafts and because the area was operating under controlled humidity.

Sketch indicates the relationship of the various parts. The installation was made on a standard, 3-ply fire door, operated on horizontal track and closed by a counterweight (W). It has been approved by the field inspector of our fire insurance carrier.

The standard fuse link was replaced by four 160 F links, arranged in parallel on loose pins, and attached to a 3-in., 4-ply rubber belt which pulls the door open. When tension on the belt is released, the door is self-closing under the effect of weight (W).

Power unit consists of a ¾ hp, 1200 rpm, 440 v, 3 phase, 60 cycle motor. It drives a gear reducer of 33 to 1 ratio through a 3-jaw coupling. (The fact that such units are frequently found in spare equipment helps keep down the cost of installation in many instances.)

The unit is mounted on a base plate which is fastened to wall brackets in such a manner as to locate a 6 in. diam by 3½ in. face flanged pulley on the output shaft in the position indicated in the drawing. An idler pulley is also fastened to a wall bracket to increase the belt wrap around the driving pulley. Weight W^1 is just sufficient to produce the required pull on the belt to overcome friction and the difference between the weight of the door and the counterweight W. This varies with the size and type of door and hanger arrangement.

Push Button Operation

The motor is controlled by relays actuated by push buttons located along the wall on either side of the opening. Two button units are used; one marked "open" and the other "closed." When the "open" button is pushed, contacts in the relay are closed, and an interlock holds them closed until the interlock circuit is interrupted by a limit switch which the door strikes when it is fully opened.

When the "close" button is pushed, another contact closes, which is wired to motor windings to reverse the direction of the motor, and is held by another interlock which is released by a limit switch actuated by the door when fully closed.

This interlock feature permits the push button stations to be some distance from the door so that operators with moving trucks can push the button as they approach the doorway and have the door fully opened when they reach it, without having to slow up materially.

In one installation where most traffic is pedestrian, we have omitted the interlocking feature on the "open" button; so that a person approaching the door may push the open button, hold it long enough for the door to open sufficiently to permit him to walk through, then release the button and proceed through the opening. Having gone through he can then push the close button and proceed, with the interlock keeping the motor in operation until the limit switch shuts it off.

Our maintenance on these units has been limited largely to lubrication of motor, reducer and pulleys; plus an occasional cleaning of the belt and drive pulley when accumulated oil or dirt creates slippage.

We have two such installations in our plant, and have yet to see any other which we think would be as inexpensive to build or to maintain.

Fig. 1. In an interlocked system, parts can be taken directly from truck to final destination in their tool crib

What to Consider When Selecting or Installing Overhead Handling Systems

Many different factors should be considered by the plant engineer to avoid unnecessary expense and gain maximum use from an overhead handling system

By R. W. ROBERTS, Manager, Trambeam Div., Whiting Corp.

IN RECENT YEARS, underhung rail-type overhead handling has gained acceptance in many different types of manufacturing plants because of its versatility, economy of installation and economy of operation. This method of handling permits maximum use of plant space for production and for storage and fits in well with other types of handling in the plant.

It should be understood that the "overhead handling systems" referred to in this article are made up of underhung cranes, for complete area coverage, and/or underhung monorail handling equipment, for point-to-point transport. The capacity of such overhead handling equipment seldom exceeds 15 tons, and is usually from 1 to 5 tons.

Planning a System

After the decision is made to adopt overhead handling within a plant, or at least to study the advisability of adopting it, the plant engineer's first step in planning the system is to decide in what areas of the plant overhead handling will be used. The divisions you will certainly want to consider in this regard are: shipping, receiving, storage (raw materials, parts in process, finished products), and production.

When the areas have been decided upon, the method of covering them is the next consideration. This step is sub-divided into deciding the type of system and the type of equipment. The three systems are: separate, individual overhead handling system in each area, department or bay; one interlocked system covering the entire plant; and one interlocked system covering several areas plus independent systems in isolated areas.

When the system has been decided upon, the type of equipment can be chosen. Monorail equipment is used for point-to-point transfer. A monorail installation is very versatile, and it permits the load to be halted or unloaded at any number of points along the route of travel. As requirements change, a monorail installation can be modified and re-routed, in a short time and at little expense.

Where over-all coverage of an area is desired, a crane installation will be chosen. The two basic types of equipment—monorail and crane—are frequently used in conjunction, in the same or in adjacent areas with the crane system interlocking with the monorail spurs.

At this point in your planning it is

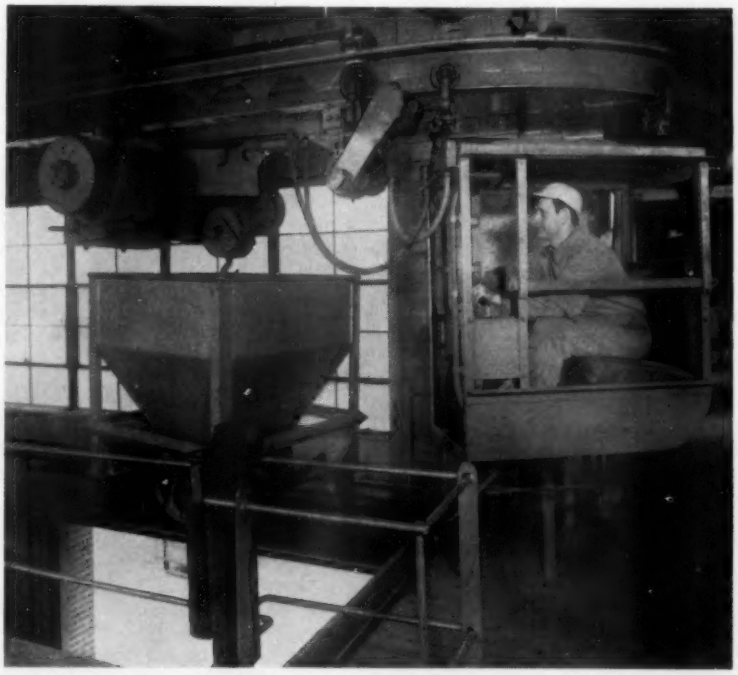


Fig. 2. Type of material to be carried—considering weight, size of load and type of container—will influence the planning and selection of an overhead handling system. Here, a hopper-type bucket is used to carry foundry sand

well to decide how the overhead handling system will mesh with other methods of handling that may be used in certain areas of the plant: gravity or power conveyors, vertical conveyors, elevators, chutes, etc.

After the overhead handling system has been planned you are prepared to make more detailed decisions. At this point you will want to decide upon the type and number of carriers to be used—both on cranes and on monorail. Items to be considered here are the weight and size of the load, and the type of container.

Individual Requirements

Factors peculiar to your own operation will influence your planning at this stage. Will the overhead handling system carry hot liquids or solids? Will it carry fluids or molten materials in open containers? Will it carry volatile or fuming liquids or solids or explosives? If you answer "yes" to any of these questions, your overhead handling equipment may require parts made of special noncorrosive metal, extra-slow speed carrier motors, special lubrication provisions, etc.

The significant factors at this stage of the planning operation are: the distance to be covered: the maximum allowable speed of travel; the frequency with which carriers will pass any given point (this is particularly true where a monorail is used on an assembly line); and the number of carriers to be used.

If you are considering the adoption of an overhead handling system in a new plant, it will be beneficial to complete a firm overhead handling plan as early as possible. The areas of the plant, foundry or warehouse to be covered by the overhead handling system should be decided upon. The type of system, the type of equipment, and the travel cycle should be determined, and the actual layout of the crane and/or monorail system should be drawn.

This planning of the handling system can precede or parallel the plans for the building, but it should be completed before the final building plans are prepared. One reason for this early planning is that the overhead handling scheme may indicate that greater manufacturing efficiency can be achieved through minor modifications of the proposed plant layout. Early planning may also indicate that slight changes in the construction plan or in the overhead handling plans will permit the use of integral building beams to support the overhead handling system.

If the overhead handling system is not planned at the same time or prior to the building plans, it may result in the building trusses being too light to support the loads imposed by the crane or monorail system. This then necessitates auxiliary supporting steel resulting in unnecessary overall expenditures.

If separate steelwork is required to support the overhead handling system, it will be more economical to provide for such extra trusses before the architect has completed construction plans.

If the entire plant is to undergo extensive remodeling, planning of the overhead handling system should follow the suggestion for a new plant.

However, if the only renovation being contemplated is the installation of an overhead handling system, you will want to use the existing steelwork, as much as possible, to support the crane runway or the monorail. Determination as to whether the existing steelwork is adequate to support the new handling system or not, is a problem that should be referred to your architect or building design engineer who is familiar with the loads already imposed on the structure.

Whether planning for a new plant or an existing one, remember to plan for adequate clearance between the high pieces of equipment on the floor of the plant and the hook of the carrier. This will present no problem as far as some plant machinery goes. But it is particularly important if your plant includes drill presses, vertical boring mills, stamping or drawing presses, and other similar tall equipment.

If such an overhead clearance problem comes up, it can be solved either by re-positioning the machinery on the plant floor or re-routing the overhead handling system, or by special application of overhead handling equipment minimizing overall space requirements for the handling equipment itself.

Remember that to enjoy the greatest degree of efficiency, economy, and the many other benefits of a modern overhead handling system, it is necessary that the planning be thorough. The plans should provide a certain degree of flexibility, to insure the future usefulness and efficiency of the handling equipment. Also—in the case of a new plant or one being extensively remodeled—early planning is necessary to realize to the fullest the many potential benefits of overhead handling.

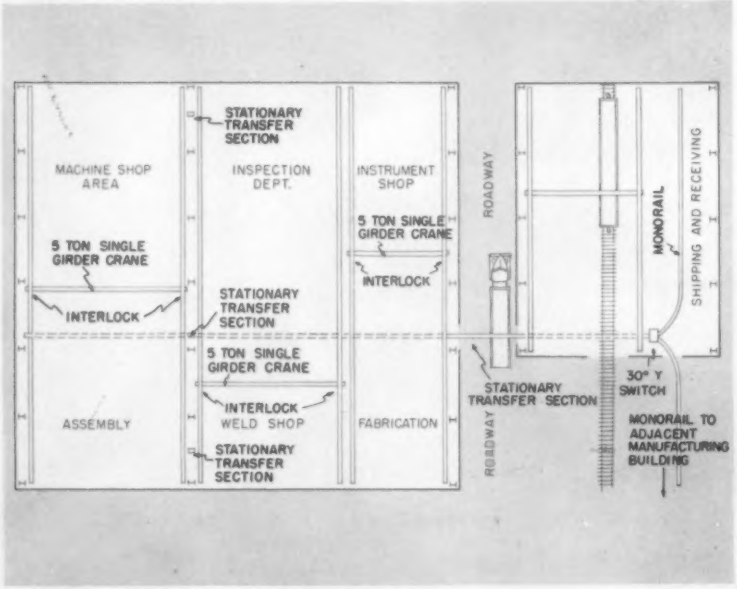


Fig. 3. Schematic of a typical overhead handling system shows how plant areas are interlocked. Stationary transfer sections link two bays at left. These bays are linked to next bay by interlocks on ends of single girder cranes. Monorail system, seen at extreme right, joins crane system by means of Y switch

Quick-Witted Alarm System

Warns of a Fire In Its Earliest Stages

FIRES WILL have a tough time getting started, thanks to a radioactive detecting system which does not depend upon visible smoke or heat for actuation. With this system the manufacturer states that it is possible to detect a fire in the earliest stage and also give a visual or audible alarm within seconds after the ignition of different types of fires.

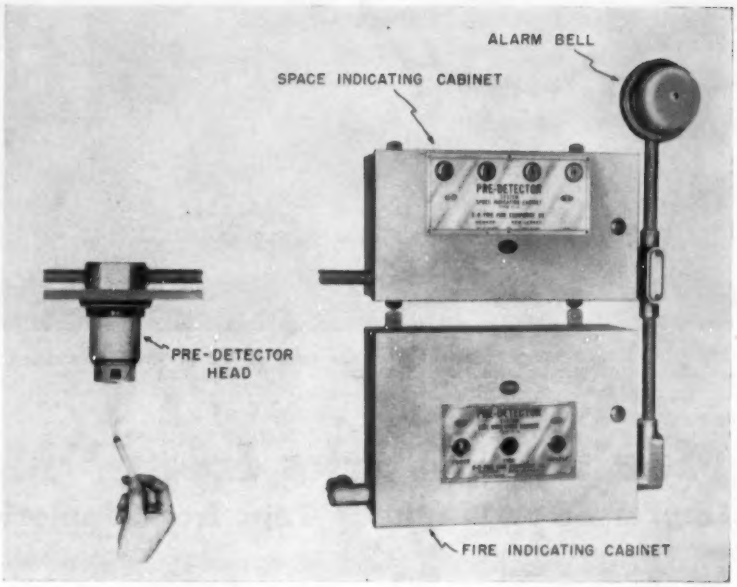
With pre-detector heads, containing the radioactive element, spaced on centers up to 60 ft apart or up to 30 ft from side walls, the system can quickly detect the smallest smoldering fire and indicate its location. It can also alert the public fire department and perform any number of functions to keep fire damage at a minimum.

The heart of this system is an overhead detection device electrically connected to a fire indicating cabinet. The concept of this pre-detector head is based on the ionization chamber principle of fire detection. Each head contains a highly sensitive gas discharge (cold cathode) tube, plus two independent chambers, one of which is exposed to the atmosphere and the other virtually sealed from the atmosphere. A minute source of radioactive material is mounted in each of these chambers, and the radiation ionizes the air in the respective chambers, causing it to become electrically conductive.

Each chamber is adjusted to give equal voltage when combustion gases or smoke are non-existent. Also, each chamber will continue to do so for an exceedingly long time, since the half-life of the radioactive material is approximately 1,600 years.

However, when combustion gases or smoke are present the balanced condition no longer exists. The chamber exposed to the atmosphere rapidly changes its condition, causing the tube to become electrically conductive, which in turn operates a relay in a space indicating cabinet, if used, or the fire indicating cabinet.

The pre-detector head is designed to be attached to a standard four-inch round electrical conduit box and each one can be adjusted to its own sensitivity without affecting the others in the circuit. As many pre-detector heads as necessary can be connected in a single two-wire circuit to the fire indicating cabinet.



Schematic arrangement of system illustrates how cigarette smoke would activate the unit. Space indicating cabinet, if used, shows location of fire, while fire indicator unit gives visual alarms for fire, power failure or system disturbance

With a single circuit, the pre-detector heads are connected directly to the fire indicating cabinet. When combustion gases or smoke are present, relays in the fire indicating cabinet function to sound alarms, close fire doors, activate fire extinguishing systems or perform other fire protection functions.

Space Indicating Unit

Where it is desirable to know the location of the fire, a space indicating cabinet can be connected through separate circuits, each circuit containing the necessary number of heads to cover specified locations. Up to four separate circuits can be connected to one space indicating cabinet and four of these can be connected to the fire indicating cabinet, making a total of 16 separate circuits or spaces being handled by one system. The space indicating cabinet shows visually, by number, the area affected and it contains relay contacts which will shut down ventilation, activate a fire extinguishing system, or perform other functions in the affected space.

The big advantage pointed out by the manufacturer of this system is the fact that invisible combustion gases as well as smoke from fire, either of a slow smoldering nature or a fast free-burning nature, will sound an alarm. Furthermore, dust and soot cause only negligible changes in sensitivity; and low temperature or humidity have no adverse effects on its operation.

Pilot installations have been made in a television station, a railroad signal tower, an electric power plant, network analyzer room, two airline flight training equipment rooms and the offices of an insurance company.

Additional Information

If you would like more information about this unit, either write The Editor, Plant Engineering, 110 South Dearborn St., Chcago 3, Illinois, or indicate "Radioactive Alarm System" on the bottom of postage-paid cards in issue.

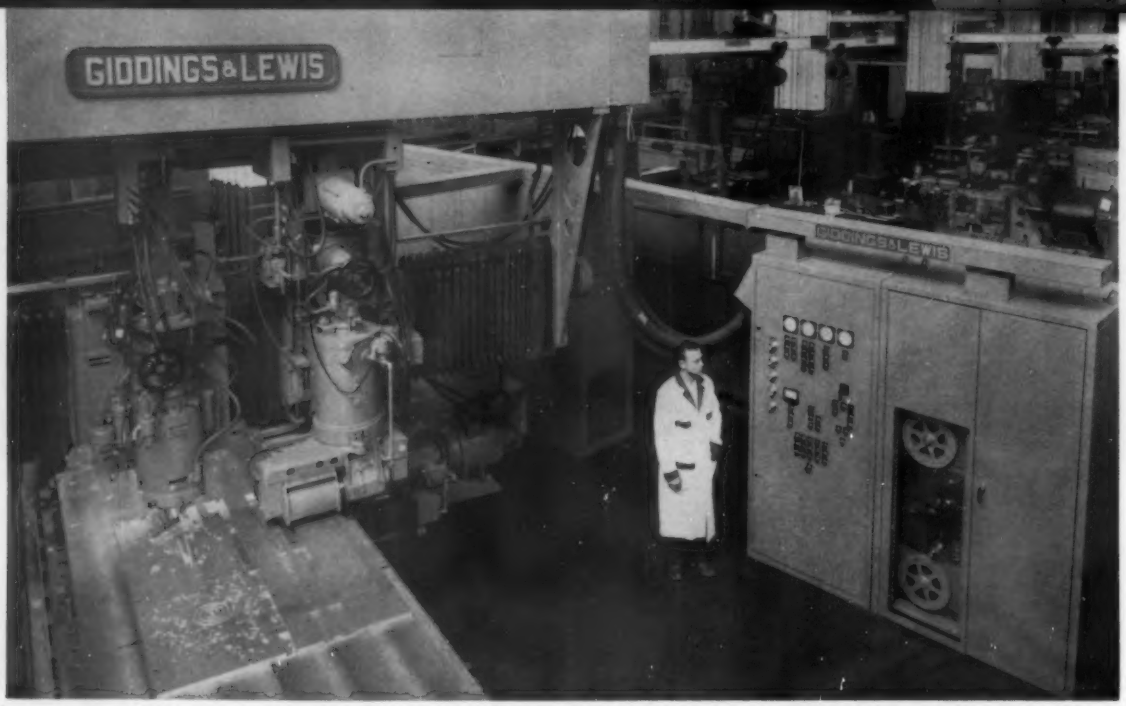


Fig. 1. Visible through cutaway panel are reels of the playback unit which controls operations of milling machine

Machine Works from "Memory"

Impressed on Magnetic Tape from Numerical Data

MILLING INTRICATELY-contoured, low-tolerance workpieces on multi-axis machines completely controlled by magnetic tape—on which entire work cycles have been programmed solely from numerical data—was proved a present-day production reality. The Giddings & Lewis Machine Tool Company of Fond du Lac, Wisconsin recently demonstrated this fact on its Numericord control system operating a skin milling machine, Fig. 1.

Resulting from three years of research, sponsored by the company, at Massachusetts Institute of Technology and allied research at the General Electric Company, this is the first commercially-available system to provide electronic preparation of machine-control magnetic tapes directly from numerical data. Of equal significance, this is the first application of completely automatic control to heavy-duty machines capable of handling large, complicated workpieces.

Historically, mechanical copying devices, cams and template tracers have been long and widely used in the industry, despite their inherent limitations. The post war years witnessed a number of attempts to overcome these limitations by substituting electronic for mechanical control through such media as punched and magnetic tape, wire and even film—all of which depend on recording from templates, initial operator-produced pieces or machine "dry runs." This system combines tape-programmed machining with electronic preparation of tapes from numerical information.

With the Numericord method, machining cycles involving as many as five machine axes, and 22 auxiliary machine functions are completely planned and engineered by mathematical computation. Pre-calculated data, in normal decimal numerical form, are processed by the system's exclusive "electronic brain" computing director into continuous phase-modulated command signals, automatically recorded on magnetic tape.

Tape Directs Machine

This "magnetic memory" tape is electronically read in the machine control unit to operate minute-current-response, wide-range amplidyne servo mechanisms which perform all feed and traverse functions automatically—repeating tirelessly and accurately the entire machining program for producing identical parts in any quantity. Tolerances are limited only by the machine tool.

While applicable to virtually any machine tool, this system was demonstrated in control of an aircraft-type spar and skin milling machine performing all "plunge," "channel," "pocket" and contouring cuts necessary to mill complete jet plane skin and wing panels from solid 75 ST Aluminum plate.

With this arrangement, such non-productive operations as tool setting, gaging, template changing and positioning are radically reduced or completely eliminated. Avoided, too, are time and material losses resulting from wasted operator motions, lack of skill, miscalculations and human error. Also eliminated are inaccuracies inherent in template-tracer controls, as well as mounting and mechanical linkage problems encountered in multiple-template contouring.

One of the remarkable features of the system is its ability to "store" skills. For complex machining work, such as airframe components, this permits release of highly-trained machine operators to other duties. Conservation of manpower is accomplished by use of less skilled operators, since machining accuracy with the system is a product of engineering planning in the tape preparation stage and is independent of the machine operator. Master tapes covering parts of prototype items can

be stored in safe locations awaiting an order for all-out production. Even more important, such vital production can be transferred from one plant to another, in a matter of hours, by this method of "storing" skills on magnetic tape.

Audio signals can be included in the magnetic tape. These can be used to alert the machine attendant to upcoming tool changes and "planned stop" machine inspection periods. Such "spoken" commands, synchronized with machine control cycles, add materially to the versatility and efficiency of Numericord machining.

Control Components

The machine-control components are physically separate from the numerical tape preparation equipment. Thus, tapes can be prepared on a continuous production basis for all machines and jobs in the shop. Files of magnetic tapes can be maintained ready for changing any machine's production from one part to another without loss of time. Even part design changes and modifications can be processed on tape ready for later production change-over.

Four major components make up the system: (1) a paper tape preparation unit, Fig. 2, which punches a master numerical tape with previously-calculated decimal information from part drawings, tooling data and machine feed rates; (2) an electronic computing director, which converts digital information on the paper tape into phase-modulated, time-coordinated command signals recorded on proper parallel channels of a magnetic tape; (3) electronic play-back circuitry, which reads commands off the magnetic tape and sends appropriate electrical control signals to the machine; (4) electro-mechanical machine-control units which operate in closed-loop feedback, phase-shift, synchro-servo systems, to position machine axes in accordance with taped command signals. Machine auxiliary functions and non-feed controls are operated automatically through relay circuits from simultaneous command impulses on other parallel tape channels.

To prepare a master paper tape, the operator merely enters previously-calculated decimal increments of desired machine axes motions and time intervals on the paper tape unit's keyboard. No conversion into usual binary code form is necessary as the unit accepts ordinary decimal digital information. Special commands are entered on the tape in the same fashion by using six auxiliary symbols supplied.

Checking circuits in the unit operate automatically to determine such command errors as exceeding feed rates or time intervals chosen, missing "plus" or "minus" signs, wrong number of digits in any command and improper least significant digit. Other supervisory circuits examine all data fed into the unit, perforating additional holes in the paper tape for logical control of the system's electronic director unit.

"Stop" codes placed in the paper tape sequence provide intervals for tool examination and replacement as well as for checking settings of machine verniers. Thus, interruption of a machining program by tool breakage merely requires return to the first previous "stop" signal, retooling and restarting of the machine-control unit. Automatic operation resumes at that stop and continues to the end of the program, unless similarly interrupted.

As an example of the system's flexibility, standard engineering-type computers can be used to short cut manual calculation of axes movements and time coordinates, tooling, feed, traverse and other data necessary to program complete part machining cycles. Such general-purpose computers usually require only the addition of readily available paper tape punching units in their output circuits to make them usable in preparing information for the Numericord's director unit.

It is the electronic computing "director" which processes decimal digital information, contained on the paper tape, into the phase-modulated continuous electrical signals for recording on magnetic tape. In operation, the director reads the punched paper tape, line for line, storing information thus serially presented in special magnetic-core memory units until later commands from the director release them to secondary memory units or directly to data-coordinating circuits for final impressing on the magnetic tape, as the program may require.

While the director is processing one group of commands, following groups are being read into it to assure continuous motion of the machine upon playback of the finished magnetic tape.

Visual indicators on the director's control-panel provide one fine and five coarse data repeaters, which algebraically sum distance commands for each machine axis during a program. The fine indicator can be connected into each of the coarse circuits by push-button, permitting the director's operator to check positions of all tool centers at any time, just as though he were controlling the machine directly.

Versatility

Control of each machine axis is accomplished, in this system of automation, by independent, closed-loop-feedback servo circuits. A movement of but 0.100 in. in a machine axis produces one complete revolution of its "tell-tale" synchro rotor.

Parallel tape channels permit simultaneous machine axes movements, together with auxiliary-function control. As examples, when a 400-cycle signal appears on a particular auxiliary function channel, drive is transferred from right to left head; when this signal disappears, drive reverts to right head. Appearance of a 200-cycle signal on another channel starts coolant flow, while on still other channels such signals automatically control oil pumps, chip conveyors, and so forth, or provide planned "stops" for both machine and tape.

The electronic playback unit, connected to the machine tool, reads all 14 channels of the magnetic tape simultaneously, sending to the machine a

Fig. 2. Numerical data from manuscript is fed into paper tape preparation unit by the 16 key control keyboard. The checking copy is typed automatically

constant stream of signals controlling all its movements and functions in accordance with requirements of the machining program. On the skin milling machine, used in the demonstration, three Cartesian axes of the machine were under numerical tape control, plus such basic functions as "start," "stop," and traverse.

Machine axes are driven by d-c motors connected through ballbearing nut and screw mechanisms. Synchro feedback is accomplished by parallel-mounted, precision rack and pinion gearing which accurately translates feed movement into rotation of the synchro's rotor shaft. Both drive and feedback assure minimum backlash and friction-free operation for maximum accuracy in positioning the tool head and improving finish of machined parts.

Extreme flexibility of the system is indicated by the number of ways in which it can be used. In addition to operating on numerically prepared tapes, the machine-control portion of the system can be used independently to produce its own tapes. One such method records machining cycles under template control. Signals are impressed on magnetic tape by machine axes synchros as they report tool head travel. When an entire program has been recorded off template, succeeding parts can be produced by playing back the tape thus produced.

Recorded tapes can be similarly produced by having the operator put the machine through simulated machining motions in a "dry run." Again synchros, attached to feed drives, record the entire program on magnetic tape just as the machine simulates it—yet with non-cutting intervals of more than 20 seconds eliminated to assure virtually continuous machining on playback of the tape. This method can also be used when the operator actually machines an initial part; the tape recording of which is then available to produce any number of succeeding duplicate parts automatically.

"Printed" Circuits

A significant advantage of the Numericord system results from its use of standard, commercial components with established records of reliability. Most electronic circuits of the computing director, magnetic tape recorder and tape playback units are "printed" for minimized service and long, trouble-free operation, Fig. 3.

All vacuum tubes are computer quality, de-rated for maximum life and arranged in plug-in type boards, of which the system has over 90. Relays have bifurcated contacts and are telephone quality. Most circuits are "fail safe" in design and both director and machine-control cabinets have individual unit power supply systems with continuously monitored under-and-over voltage protection.

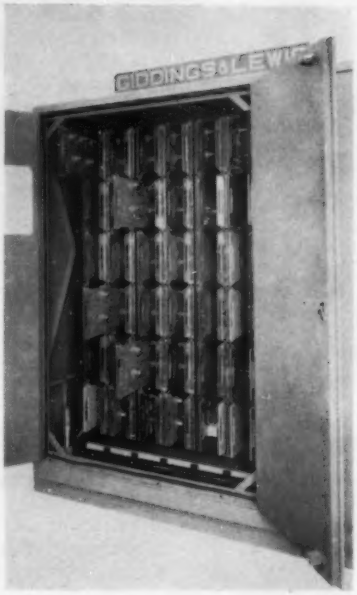
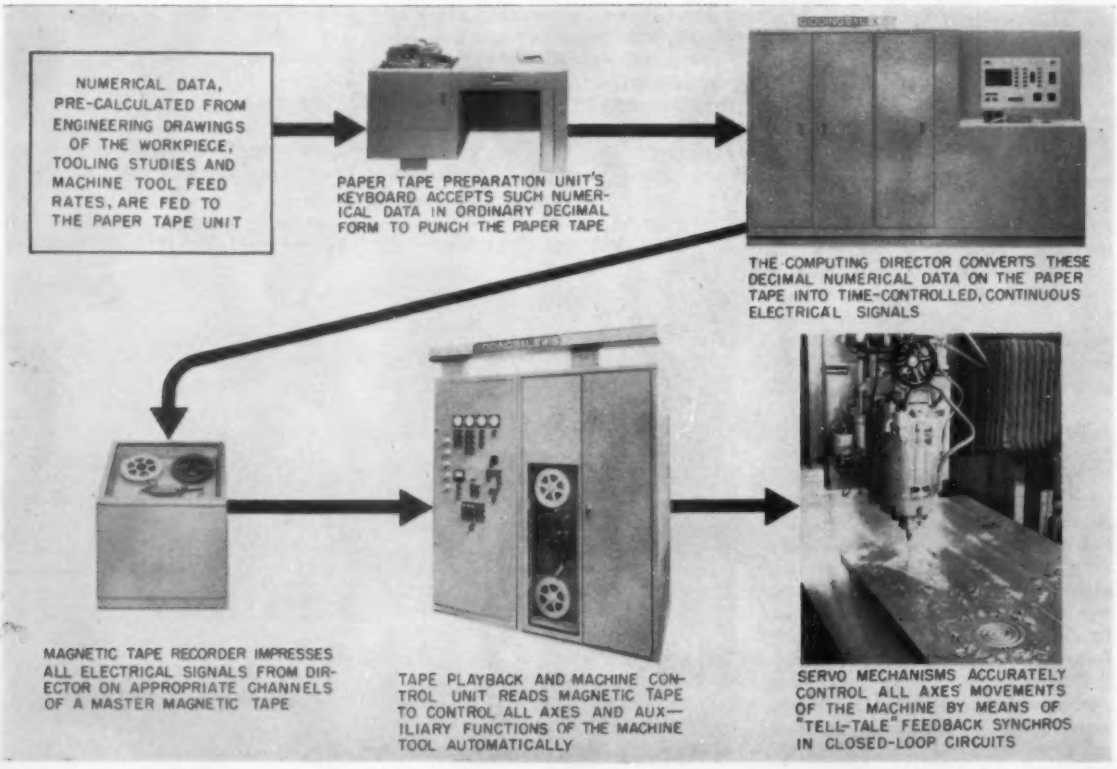


Fig. 3. Over 90 printed circuit panels with rear plug-in contacts are a boon to system maintenance and inspection

Fig. 4. Here are components of the automation system; illustration shows how data is transformed into machine motions


NUMERICAL DATA, PRE-CALCULATED FROM ENGINEERING DRAWINGS OF THE WORKPIECE, TOOLING STUDIES AND MACHINE TOOL FEED RATES, ARE FED TO THE PAPER TAPE UNIT
PAPER TAPE PREPARATION UNIT'S KEYBOARD ACCEPTS SUCH NUMERICAL DATA IN ORDINARY DECIMAL FORM TO PUNCH THE PAPER TAPE
THE COMPUTING DIRECTOR CONVERTS THESE DECIMAL NUMERICAL DATA ON THE PAPER TAPE INTO TIME-CONTROLLED, CONTINUOUS ELECTRICAL SIGNALS
MAGNETIC TAPE RECORDER IMPRESSES ALL ELECTRICAL SIGNALS FROM DIRECTOR ON APPROPRIATE CHANNELS OF A MASTER MAGNETIC TAPE
TAPE PLAYBACK AND MACHINE CONTROL UNIT READS MAGNETIC TAPE TO CONTROL ALL AXES AND AUXILIARY FUNCTIONS OF THE MACHINE TOOL AUTOMATICALLY
SERVO MECHANISMS ACCURATELY CONTROL ALL AXES MOVEMENTS OF THE MACHINE BY MEANS OF "TELL-TALE" FEEDBACK SYNCHROS IN CLOSED-LOOP CIRCUITS

Left to right, standing: Leo J. Monty, Artisan Metal Products Co., Treasurer; Richard H. Morris, President of American Institute of Plant Engineers; Robert C. Holman, Bird & Son, Inc., Chairman of Entertainment Committee; Edward W. Benner, American Sugar Refining Co., Councilor; Milton Davis, Sylvania Electric Products Co., Vice-President-Elect; Seated: Hon. Charles Gibbons, Massachusetts Legislature; Daniel J. Shea, Simplex Wire & Cable Co., President-Elect; James Sweet, Harvard Brewing Co., President; Louis Schoenherr, New England Confectionery Co., Secretary; Linnell Studley

Boston Club Celebrates Fortieth Year

Seventeen Past Presidents Attend Annual Meeting

NEARLY 100 MEMBERS and guests attended the Fortieth Annual Dinner Meeting of the Boston Plant Engineers' Club, held at the Somerset Hotel, Boston, May 19. Speaker of the evening was the Hon. Charles Gibbons, member of the Massachusetts legislature.

A social period preceded the dinner; following this there was a brief business session at which the nominating committee's slate of candidates for 1955-56 was announced. The elected members moved that the secretary cast a unanimous vote for the slate which consisted of Daniel J. Shea, President; Milton Davis, Vice-President; Louis Schoenherr, Secretary; and Leo Monty, Treasurer.

One feature of the evening was a presentation of the past presidents, seventeen of whom were in attendance. They are shown in the photo below.

Past presidents, standing, left to right: John J. C. Coffin, 1953-54; Edward A. Elfstrom, 1948-49; Russell F. Greenough, 1946-47; Willard F. Whitman, 1943-44; James Sweet, 1954-55; Edward W. Benner, 1952-53; Lester C. Leach, 1949-50; Joseph A. Sheehan, 1938-39; Albert A. Fava, 1947-48; and Richard Williamson, 1945-46. Front row, left to right; Leo J. Monty, 1951-52; Roy D. Hall, 1940-41; Edwin L. Nute, 1939-40; Ralph P. Kneeland, 1933-35; Calvin P. Eldred, 1935-37; Wayne S. Baldus, 1937-38; George E. Freethy, 1944-45. Very few living past-presidents were not in attendance

Fig. 1. Regulation uniform for all 750 employees in the area is worn here by Lucille Groom as she enters "Snow White" assembly area through one of the air locks. Air lock features a large floor grating where downward draft pulls foreign particles off shoes and garments of all entering personnel

Fig. 2. Maintenance men continually vacuum clean the floor to pick up loose particles of lint, dust and dirt. Another group of maintenance men follow with chemically treated cloths to pick up any foreign substances that the vacuum might have missed. Area is thus kept "white glove clean"

Operation "Snow White"

Cuts Rejects, Increases Product Reliability for General Electric

SIGNIFICANT PROGRESS in the control of lint and dust in the manufacture of both high-reliability miniature and subminiature tubes has been made at the General Electric Five-Star receiving tube plant at Owensboro, Ky.

According to L. B. Davis, general manager of receiving tube operations, tube inoperatives, mainly due to intermittent shorts caused by lint and dust, now are one-third of what they were before the program started.

Seven hundred and fifty employees in white lintless uniforms—nylon and dacron—assemble these tubes under glass hoods in a glistening white factory pressurized by filtered air.

Basic to the success of the program has been the institution of rigid controls over the movements of materials and personnel in the factory area. The entire Snow White area now is in a separate building at the Owensboro plant.

Air locks approximately 15 ft long and 12 ft wide were installed at the Snow White entrances and all employees must pass through these locks to enter the 30,000 sq-ft assembly area. This area is pressurized with filtered air—70,000 cfm being pumped into the area and 40,000 cfm is taken out through a system of ducts. The "difference" of 30,000 cfm escapes and effectively dust seals the air locks and any possible cracks or other openings.

Each person entering Snow White receives a mild vacuum cleaning as he or she walks over a floor grating through which air is exhausted. The grating covers the entire width of the door leading into the work area.

Adjoining the air lock, a special cloak room for Snow White employees was constructed. All employees must leave their outer garments here before they may pass through the air lock on their way to the assembly area.

To further reduce traffic, messengers leave all mail scheduled for the Snow White operation in a mail rack in the air lock. The mail is then picked up by a Snow White employee and delivered to special offices located in the pressurized section but closed off from the actual working area.

"The success of this program is attributed largely to the enthusiastic support of our employees in observing every rule we have laid down," said Mr. Davis. For example, he pointed out that the operators are pleased with the special lint-free uniforms which are now required.

The women employees have 12 styles of white nylon and dacron uniforms to choose from. The company issued cash value certificates to each operator which covered the major part of the cost of two uniforms. Local merchants were given advance notice of the changeover so they would be prepared to fill the demand for special dresses.

Male supervisors wear a uniform consisting of white dacron or nylon shirt and blue dacron pants. The shirt is short-sleeved with a sport shirt neck. Ties of nylon or dacron are optional. They also wear nylon socks and some wear nylon or dacron belts.

Since no one may enter the area with lint-shedding clothing, personnel from other buildings wishing to enter the area must don one of the white lintless coats which are kept hanging in a steel locker in the air lock.

The entire working force on the project has been thoroughly indoctrinated in the necessity for extra cleanliness in the manufacture of Five-Star types. A group of maintenance men alternately clean the entire floor with industrial type vacuum cleaners, and with chemically-treated cloths. At any time of the day, the floors could pass a white-glove inspection.

Each operator cleans her own work station thoroughly twice daily. Every hour, operators replace the rubber cots they wear on all fingers to protect the tube mounts against moisture and other foreign substances.

Special protective hoods have been designed to cover all assembly mounts. Here the operator can use her hands with complete freedom under the hood and, since all hoods are fitted with large windows, she has an unimpaired view of her work at all times.

In addition, the conveyors which move the tube mounts along the assembly line are also constructed of rubber which gives off no lint and can be easily cleaned.

Previous to the actual assembly process, all grid sub-assemblies are put through a special cleaning operation to free them of dirt, dust and lint. After the cleaning, the grids are rinsed in distilled water and twice in methanol. The latter rinse is used to dry the grids faster. Following the drying process in an electrically heated oven, the grids are sorted, inspected for mechanical perfection and for lint, dirt and dust particles. The grids, still on the trays, are then placed in glassine bags which are stapled shut to keep them lint and dust-free while being transported to the mount line.

Assembly of the miniature and subminiature tubes, performed under the lint-protecting glass hoods, begins with cage assembly, where components are placed in precision-made jigs.

After pin connections are welded—also under glass—the mount is inspected under a 10-power binocular microscope for chipped micas, weld splashes, mechanical failures such as a break in the wire, and for lint and dust.

In the final operations, the mount is placed in a coil which demagnetizes the metal parts while at the same time an air stream blows off any foreign particles which may have caught on the mount. Then the mount receives a second complete microscope inspection and is inserted into the envelope.

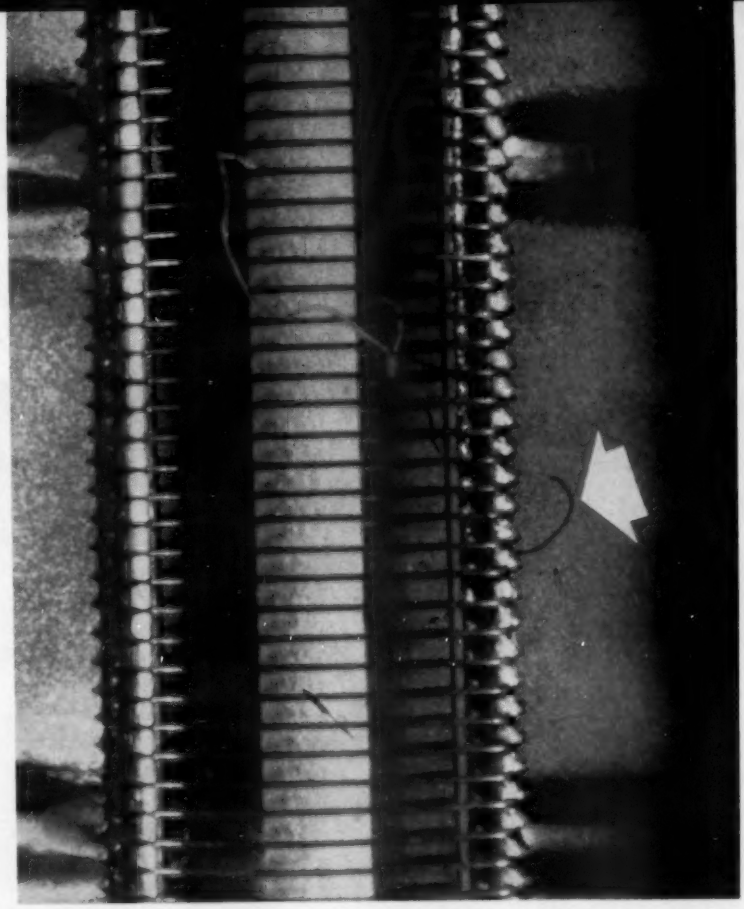


Fig. 3. And here is one of the reasons why General Electric has gone to such exacting pains to create a dust-free, lint-free atmosphere. Magnification of one of the sub-miniature tube grids shows a piece of lint entwined in the grid of a tube. This can cause an intermittent short, a faulty tube, another reject

Fig. 4. Welder performs second step in the assembly of the tube under a protective hooding. Rubber cots on each finger, replaced every hour, protect the mount from moisture and other foreign substances. The lint-free rubber conveyor belt, located immediately under operator's hands, moves mount to next operator

Here's How Michigan

By BERNARD D. BLOOMFIELD, Ventilation Engineer,

Fig. 1. These men are taking samples at both the inlet and outlet collectors at the same time during an efficiency study

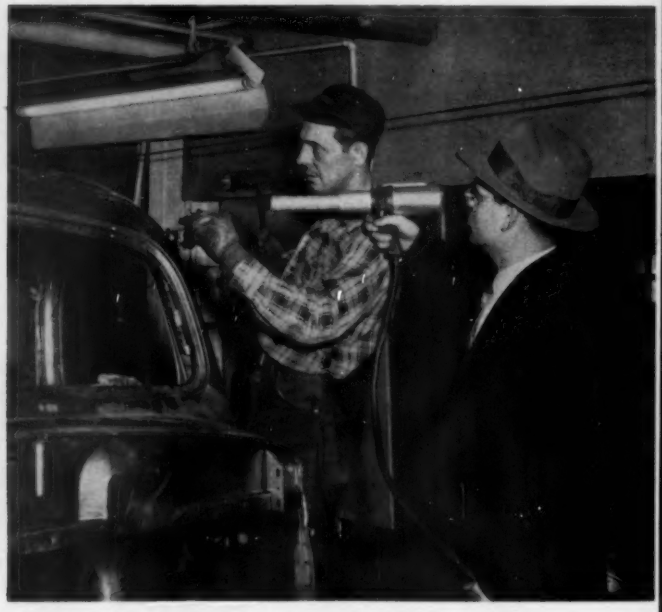


Fig. 2. A Division engineer is sampling for lead fumes at a soldering operation as worker fills in welded joints

INDUSTRY IN Michigan has an interested observer and a competent counselor in a wide range of every-day problems which are concerned with the working environment. This interested observer is the Division of Occupational Health which is part of the State of Michigan's Health Department, staffed by 15 engineers.

Its most important function is the control and prevention of occupational disease, but because of the specialized skills of its staff members, the Division also services other government agencies such as the State Labor Department, the State Fire Marshal's office, and the State Police, and assumes responsibilities in the field of atmospheric pollution.

Specifically the Division is interested in the control of health hazards associated with everyday operations and processes in industry. Considering the increasing complexity and scope of industrial operations which have accompanied the great advances in technology, the task of the Division appears to be unlimited.

It is difficult to conceive of any manufactured item that did not at some point in its production necessitate the use of some type of control measures for the protection of the workers involved in the manufacturing process. For example, most automobile and truck manufacturers fill in body indentations at welded joints with considerable quantities of high lead solders (see Fig. 2) which are later ground down with automatic disc grinders. This operation gives rise to hazardous concentrations of lead dust and suitable control measures in the form of ventilation and respiratory protection are required to protect the workers.

Similarly in the paint spraying of automobile bodies, high concentrations of toxic paint solvents can develop if the ventilation control is inadequate. In foundries we have the silicosis hazard by virtue of the silica content of molding sands and other associated working environment problems such as the build-up of extremely irritating core oil gases, excessive noise, and high levels of radiant heat.

Some manufacturers of aluminum storm sash anodize their product using the electrolytic sulfuric acid bath process which gives rise to sulfuric acid mist sometimes in excessive concentrations. Also, in some stages of the manufacturing process, it is necessary to degrease the aluminum parts with trichlorethylene, a toxic chlorinated hydrocarbon solvent. A hazardous atmosphere may easily develop if the degreasing equipment, whether it be manual or automatic, is not operated properly.

If by coincidence welding operations are conducted in an area where the workroom air is contaminated with any of the chlorinated hydrocarbon solvents, there is always the possibility of solvent breakdown due to high temperatures at the welding arc with the resulting formation of the extremely toxic phosgene gas.

The Division's activities in industry are in the form of a widely accepted service made available by the State Health Department. Although a portion of the Division's work is on the

Helps Control Plant Health Hazards

Division of Occupational Health, State of Michigan Health Department

Fig. 3. While this worker performs his routine tasks, test sample is taken of the breathing zone to determine the amount of concentration of insecticide dust

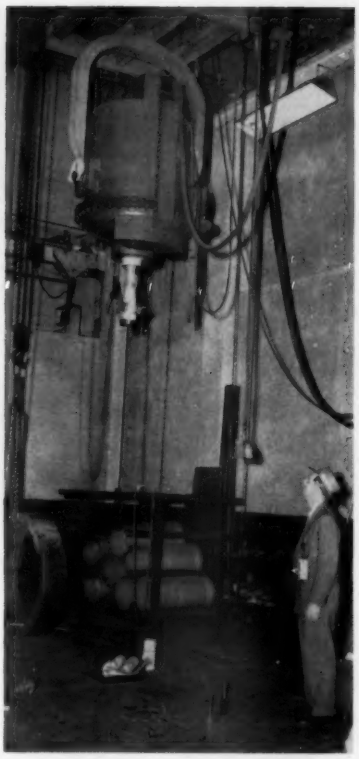


Fig. 4. Division engineer checks this one million volt industrial x-ray unit

self-initiated basis where routine visits to old and new industrial establishments are made, the majority of plant visits are on a request basis, the request being submitted by management, labor unions, individual employees, physicians, the State Labor Department, the State Fire Marshal's office, and others.

For the purpose of ease of operation and effective coverage, Michigan is divided into eight industrial areas, and each area is covered by a district office and complemented with adequate engineering personnel and equipment. The district engineer is in charge of all occupational health activities in his area and in a sense may be regarded as the foot soldier of the Division. Contacts with industry are made by the district office personnel who are assisted when necessary by central office engineering consultants.

Consulting services are available in the fields of industrial ventilation, acoustics, air pollution, and radiation, and are complete in the sense that control recommendations include not only the what-has-to-be-done approach but also detailed procedures as to how various control objectives may be attained.

As a result of the inspection, the industrial ventilation engineer prepares a report which, if requested by the plant, will include detailed drawings, construction specifications, and general recommendations concerning the selection of equipment. Similarly, detailed recommendations are submitted in regard to industrial radiation problems where proper shielding is of the utmost importance; in air pollution where a considerable amount of money can be wasted if the choice of air cleaning equipment is not right; and in the field of acoustics where an improper understanding of sound theory often results in costly installations, which do little to alleviate excessive noise levels. These services are all made available to industry at no direct cost.

The State Fire Marshal's office and local fire departments rely on the Division for assistance in various problems

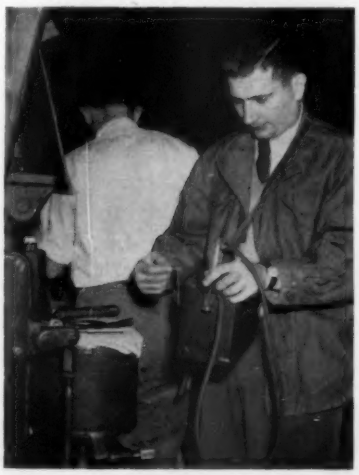


Fig. 5. Author uses impinger apparatus to take sample near grinding operation

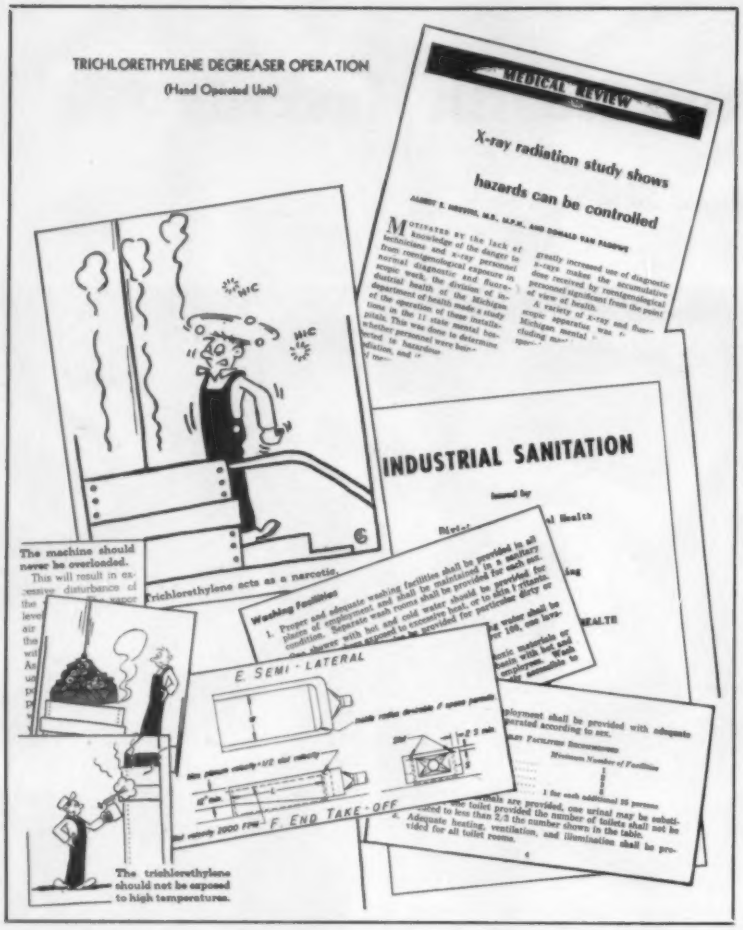

TRICHLORETHYLENE DEGREASER OPERATION
(Hand Operated Unit)
MEDICAL REVIEW
X-ray radiation study shows
hazards can be controlled
INDUSTRIAL SANITATION
E. SEMI - LATERAL
F. END TAKE - OFF
The machine should never be overloaded.
Trichlorethylene acts as a narcotic.
The trichlorethylene should not be exposed to high temperatures.

Fig. 6. Illustrated above are examples of the numerous ways in which the Division distributes information to industry on the occupational health requirements

Fig. 7. Dry cleaning plants using solvents which present a health hazard have to be approved by the Division. Here, an engineer studies the solvent exposure

such as explosion hazards, advice on respiratory protective devices and evaluation of industrial processes considered to be potential fire hazards. Since the State Fire Marshal's office licenses all dry cleaning establishments, those plants using the non-flammable or synthetic type solvent which present health hazards have to be approved by the Division of Occupational Health before licenses are issued. Figure 7 shows a dry cleaning plant study in progress. The engineer is using a Halide leak detector to determine the concentration of solvent in the workroom.

Such items as dust collector performance (Fig. 1), garage ventilation, layout of motor test laboratories, underground parking facilities, school room ventilation, X-ray shielding in medical establishments, explosion problems in grain elevators, the storage of liquid ammonia used as a fertilizer and the use of certain materials as fire extinguishing agents (carbon tetrachloride for instance) are among the many handled by the Division.

Technical papers are prepared for industrial personnel on such subjects as proper operation of manual degreasers, industrial sanitation, the carbon tetrachloride hazard, and many others. In addition to this service, an annual Industrial Ventilation Training Course is offered at the Kellogg Center located on the campus of Michigan State College.

The Division staff originated the ventilation short course with the cooperation of the college and since 1952 has offered it annually. The course program includes talks by authorities in the field of industrial ventilation.

Services in Other States

Industrial health services available from state to state will vary. To cite an example, Michigan's service includes the complete design of a ventilation system when requested by the industry concerned. However, it is not compulsory for the industry to submit drawings for the Division's approval. But, in New York State, the submission of drawings to the Industrial Hygiene Section of the Department of Labor is required by law, yet, on the other hand, they offer no design service.

To find out what services are available locally, plant engineers should contact their state's Division of Occupational Health. A Directory of Governmental Industrial Hygiene Personnel, issued by the Occupational Health Field Headquarters, U. S. Public Health Service, 1014 Broadway, Cincinnati 2, Ohio, lists the states offering occupational health services as well as the personnel in charge.

Pump Handles Solids with Kid Gloves

Features Recessed Impeller for Trouble-Free Service

PUMPING OF anything from live fish to ready-mixed concrete has proved possible in test installations of a new solids pump recently introduced to industry.

Several actual installations of the pump, according to the manufacturer, have shown that the pump can handle fresh fruit from orchard to cannery without damaging it. It can pump crushed ore pulp or ready-mixed concrete without binding on large chunks or suffering wear at an excessive rate. It can also pump waste material without clogging on rags, rope, string and rubber.

This pump operates on a rather unusual materials moving principle. Its impeller is similar to an automobile fluid drive, and though entirely out of the material flow pattern, it induces a vortex that does the pumping. The rotating fluid mass forms a buffer between the impeller and the solid particles and chunks in the flow so that few of them ever touch. There is no clogging because the interior of the pump offers no restriction to flow.

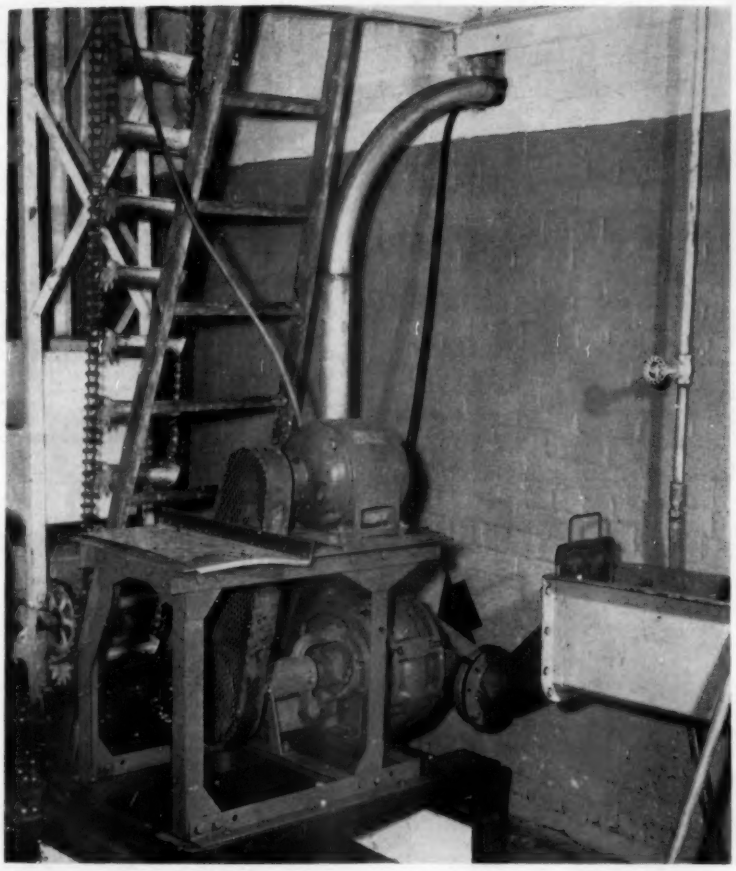
Industrial Applications

The manufacturer cites several case histories of how this pump is used in industry. One example is at a California food packing plant where cherries arrive at the sorting tables undamaged after being pumped through a 4-in. rubber hose. A 3-in. solids pump sucks them up from the brine barrels in which they are received. This hydraulic transport system has now operated a full season without maintenance.

The cherries flow through the completely open pump case. They do not pass through the impeller, but instead are moved along in a flow induced by the swirl inside the case. Since the interior of the pump is free of projections, it does not bruise or damage the materials being pumped.

Another example is the way it has eased the job of the service crews that travel the Los Angeles county area keeping the sewage booster pumping stations in operation. They now have one stop that is faster than the others.

Previously a conventional sewage pump required a 2-in. bar screen to protect it from rags, wood and stones that find their way into the system. Every day the service crew would pull out the bar screen and rake off the accumulated rags and rubbish. In spite of the screen, the pump would clog once or twice a week and require a three or four hour teardown.



Cooked hominy is handled by this new solids pump (arrow) at the Stokely-Van Camp plant in Oakland, California. Solids range from 10 to 66 per cent

When the new pump was installed, the protective bar screens were removed. Everything now goes through the pump, and after many months of operation nothing has stuck.

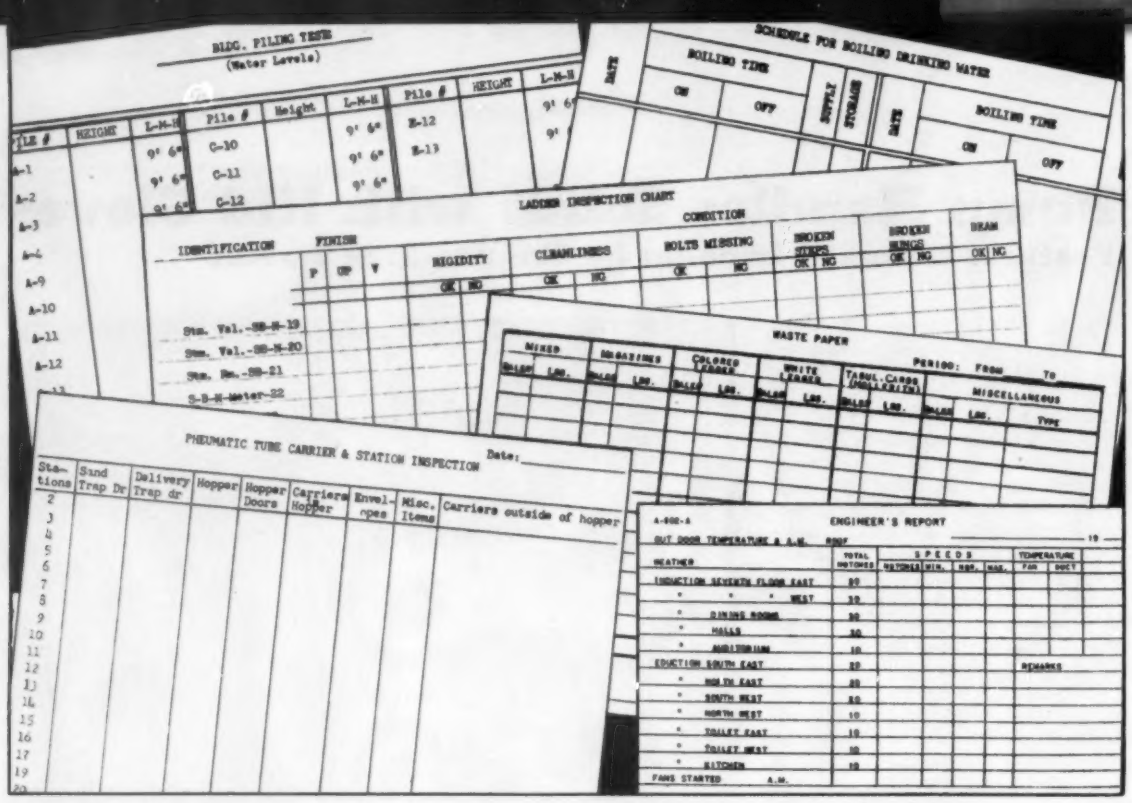
In another instance a wet grinding operation in a lead-zinc ore processing plant used to grind up the sand pumps almost as fast as it ground the ore. The ore was so abrasive that sand pump parts would last four days at the most. Surges in feed and chunks of ore would bog the pumps down until they stopped.

Using a 3-in. Wemco solids pump solved the problem. The surges that occurred sometimes increased the solids content of the feed from its normal 65 per cent to as high as 80 per cent, producing a thick gritty mud. The new pump goes right on pumping until the surge load is relieved and normal operation restored.

The amount of wear on the pump parts per ton of solids pumped has also been much reduced. This can be explained by the fact that only a small percentage of the solid particles pumped actually touch the impeller.

Want More Information?

If you would like more information about the pump, either write The Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Illinois, or indicate "Solids Pump" on bottom of postage-paid card in issue.



MAINTENANCE IS A RECORD BUSINESS

At Northwestern Mutual Life Building

FIFTEEN hundred desk-bound folks who work at 720 East Wisconsin Avenue in Milwaukee, Wis., will tell you that theirs is the cleanest and most comfortable building in the city.

This particular building houses the Northwestern Mutual Life Insurance Company and its employees. Responsible for its spotless, gleaming appearance from sub-basement to penthouse are Fred H. Diesenreiter, Building Superintendent and his assistant, Richard A. Bergemann.

Joining the staff in 1908 as assistant electrician, Mr. Diesenreiter was appointed assistant building superintendent in 1932 and superintendent in 1941. When the company's new building was constructed he took part in planning the layout of mechanical equipment.

With experience in sheet metal work, estimating and pattern drawing, Dick Bergemann joined the maintenance staff in 1934. He has also added mechanical drafting, building engineering, structural drafting and personnel administration to his background. Dick was appointed assistant building superintendent in 1945.

Mr. Diesenreiter directs a maintenance staff whose primary object is to operate the building for the benefit and comfort of the people working there; to make sure that they will not be delayed in their work nor in their coming and going to and from the building.

This is a big job, for the building, with a floor area of 550,652 sq ft, is eight stories high and has in addition, equipment penthouses and two basements. To give some idea of the maintenance department's scope of operations, its functions include: the provision of heating, lighting, ventilation, refrigeration, cleaning, sanitation, elevator operation, mail delivery, and pneumatic tube service. In addition, it is responsible for maintenance, repair and alteration to the building itself; construction of some office furniture and equipment; and repair of office machines. It has also had a hand in research engineering and pattern making for special equipment such as the micro-filming machine now used throughout the insurance field.

There are more than 260 motors in the power system alone, some of which are mounted on white faced brick foundations; the lighting system contains over 5,000 incandescent and fluorescent light fixtures; the elevator system comprises 14 passenger, four freight and eight dumb waiters; the clock circuits include 132 wall clocks, 31 time recorders and 40 time stamps; and there is a pneumatic tube system with 6.8 miles of 4 in. brass tubing, 492 document carriers and 50 tube stations.

The task of keeping everything in order and providing necessary services is accomplished through the use of a carefully planned, highly detailed system of form records. A comprehensive set of maintenance and work memoranda, developed over a period of several years has proved invaluable in maintaining the building. The maintenance staff is, of course, vitally interested in economy of operation and by having detailed records at its fingertips, has been able to work out ways of substantially reducing many costs.

Thirty different daily, weekly and monthly reports comprise the collection. The basis for these records is a card system, arranged by month, of every maintenance job that has to be done at a specific time during the year. This list is cross indexed so that a job which is carried out three times a

year appears under the three appropriate months. Duties are scheduled to spread over the twelve months as evenly as possible.

While many maintenance departments shy away from using such a complete set of forms, Mr. Diesenreiter believes that only by their use can the building be maintained as efficiently and smoothly as it is. With complete records at hand, there are no hit or miss operations, but a steady, thorough program of preventive maintenance. The records, too, not only provide a continuous check by the superintendent on work done but the men themselves are also able to check their own work by reference to them. The reason that this record system is so successful is that every detail is included; nothing is left to memory.

One of the most important records kept is the Engineer's Report. It shows detailed information relative to indoor and outdoor temperatures, time of turning high and low pressure steam on and off, the speed at which supply and exhaust fans are being operated, refrigeration compressor data, brine pump operation, etc. In connection with the operation of ventilating and heating equipment, floor temperature readings are recorded hourly from four locations on eight floors from 8 am to 5 pm. Fan temperatures are recorded on the same form every half-hour. All information is taken from a temperature indicator board located in the engine room. Should any equipment become inoperative, corrective measures can be taken before causing too much discomfort to occupants of the area affected.

Part of the duty schedule for a typical month, November, reads:

Inspect and repair door hardware.
Check for necessary repairs and painting of all air washer tanks.
Inspect and service all ladders.
Repair and clean all screens. Put up on or about June 1, remove about Nov. 15.
Clean radiator enclosures in Stairway No. 1 during Feb/May/Aug/Nov.
Flag to be flown on Armistice Day (Nov. 11) Note: if holiday falls on a Sun., fly flag on both Sun. & Mon.
Mason St. entrance guard to turn off the night lights at 7:30 am during period from Nov. 1 to Apr. 15.
Turn off water supply to lawn sprinklers on or about Nov. 17; turn on Apr. 10.
Turn on direct heating in stairways on or about Nov. 1; off about Apr. 1.
Simonize North Bldg. elevator cab panels during May and Nov.

Pneumatic tube system requires monthly inspection of 6 miles of brass tubing

Other forms which are filled out by maintenance personnel, provide a record of operation maintenance and include a daily watchman's report that comprises checking for leakage at fire hose connections, fire extinguishers, and vacuum cleaner outlets; a list of public and corridor lights which are out of order; and a painter's work sheet showing location and description of work.

The set of records includes a form on which are recorded, four times yearly, the water levels at each of the 67 piling well points in the sub-basement; a maintenance order form, made out in duplicate, on which all work assignments are made; a waste paper form on which is recorded the various types of paper, number of bales and weight of paper collected and sold; a mail pickup and delivery form; and a building temperature form on which hourly readings are recorded at night and on Saturdays, Sundays and holidays.

During the first week of each month, the head day janitor makes a thorough housekeeping inspection of the building from the roof to the sub-basement. He fills out an inspection form which acts as a guide. Maintenance work orders are issued for each item entered in his report.

Should any maintenance employee want to report a condition requiring attention, he fills out a "Report to Bldg. Supt.'s Office" form. These too are given immediate attention.

Because of a thorough maintenance and housekeeping job, much of the forty year old original equipment is still in good condition and replacements are at a minimum. The room temperature and ventilating control system was installed when the building was erected in 1913 by the Johnson Service Co., and in 1932, a similar system was installed in the new addition. The old, or South Building, has a capacity of 4,124,000 cu ft while the new addition, or North Building has a capacity of 5,139,103 cu ft. Each building has its own heating and ventilating system, the latter consisting of 17 supply units and 19 exhaust fans.

In 1942 electronic controls were installed on the heating systems in both buildings. The control devices operate main steam reducing pressure valves in accordance with demand for heating. These controls and the change in operation from atmospheric to vacuum system have added to the comfort of the occupants of the building due to lower radiator temperatures. An additional gain is in connection with the heating system traps. Less opening and closing of traps has reduced the wear on them and therefore less maintenance is required.

Savings Tracked

In order to get a true picture of savings attributable to these installations, Mr. Diesenreiter referred to records for the heating season just prior to the installations and the heating season of 1953 to 1954. Steam consumption was reduced 30.8 per cent in this period and savings were realized despite the fact that the cost of steam had risen over 49.7 per cent during this period: from $.6117 per thousand lb in 1941, to $.9158 per thousand lb in 1954. Since careful records were kept before the installation of the electronic controls, it was possible to compare costs very easily. Records show that in each year of operation, the system has more than paid in savings for its original cost.

Another big operation which requires careful supervision, is the pneumatic tube system. On a busy day, some 5,000 carriers are handled, and

at these times the lapse between the arrival and dispatch of carriers rarely amounts to more than 30 seconds. It is obvious then, that regular, thorough checks of the complete system are necessary, and this is done at monthly intervals. The condition of all document carriers, sending and delivery trap doors, receiving hoppers, number of foreign carriers and various other items, are noted on a form for this purpose. The number of document carriers repaired by the tube system inspectors is also recorded.

It was found from experience that for this particular organization, spot replacement of burned out lamps is more economical than group replacement. So that the quickest and most economical service is provided, lamp replacement requests are accumulated in the maintenance office and are serviced three times daily, at 9:00 am, 11:15 am, and 1:30 pm. A specially built truck, equipped with suitable ladders and lamps, is used for this job.

Mr. Diesenreiter and his staff are not only efficient in maintaining the building and its facilities but they find time to give extra services and take on many tasks which the average building maintenance department does not feel are within its province, and consequently sends "outside." The reason for this is that many of the men are skilled craftsmen—machinists, cabinet makers, plumbers, electricians, painters, carpenters, etc.

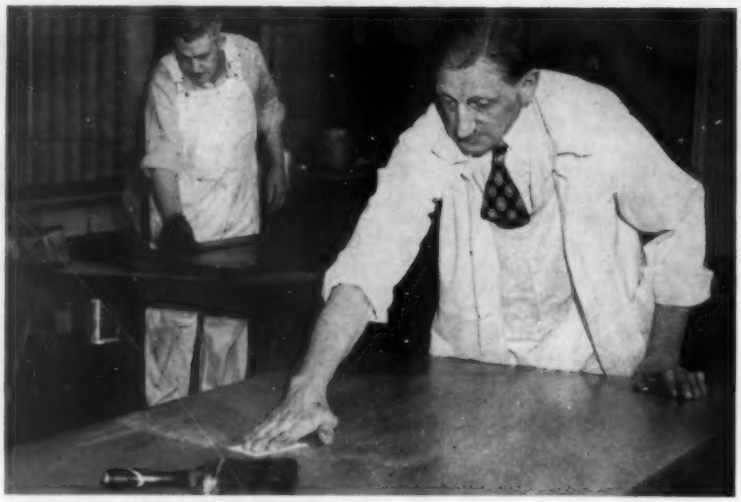
One example is the drinking water. Before the days of the filtration plant in Milwaukee, all drinking water used in the building was boiled. Because the equipment was available, even after the installation of the filtration plant, the practice of boiling the water was continued (at a very nominal cost) and still is, "just to make sure." Thorough in this, as in all its work, the maintenance department rules that the water be held close to the boiling point for 30 minutes. It is pre-cooled, aerated and then refrigerated before being piped throughout the building. And, of course, each of these operations is checked on the appropriate form.

Other additional services provided by the building maintenance department include the refinishing of office furniture, which is carried on in a recently constructed room, complete with spray booth, in one of the two penthouses, and carpenter and cabinet work which is done in a sub-basement shop. The paint and carpenter shops are well lighted and ventilated and both are sprinkler serviced.

Safety, too, comes within the scope of the maintenance department. For the past two years it has organized a two-hour safety course, given on one day, three times a year. These sessions have proved popular with maintenance personnel because they encompass the hazards found on the individual's own jobs. Voluntary attendance of maintenance employees at the Milwaukee Chamber of Commerce safety school has tripled since the safety training began.

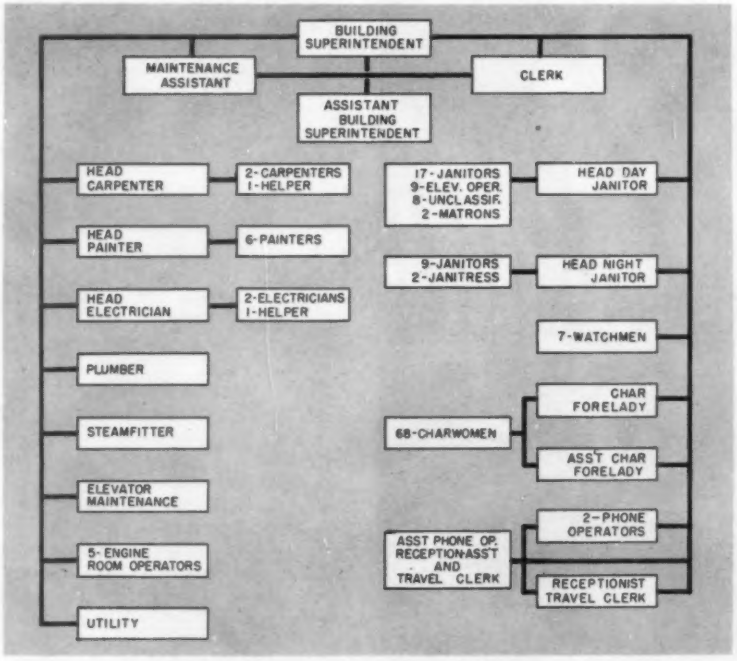
During the past year, special emphasis was placed on ladder safety. There are over one hundred ladders of various types, including extension, step, straight and pointed throughout the building. Every ladder has an identification painted in some conspicuous part. The code used is simple and effective, and has helped to keep ladders in their proper locations. It is also an aid in making inspections.

Mr. Diesenreiter, his assistant and staff are rightly proud of the job they have done, and continue to do in "their" building. Such a large and detailed undertaking, believes Mr. Diesenreiter, has only been accomplished so successfully by keeping careful track of every operation and expenditure that could conceivably be recorded.



One of the "extras" provided by the maintenance department is refinishing office furniture. Remodelling an office is also within its scope.

Chart shows organization of the maintenance department, also cleaning staff. Size of department is considered, by company, average for the building



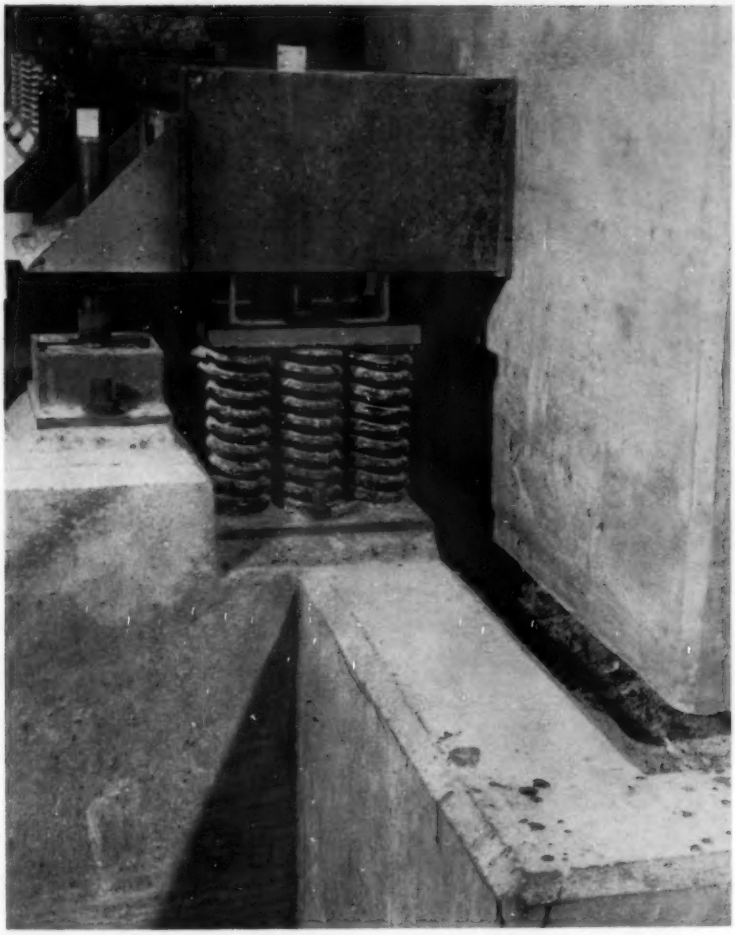


Fig. 1. Corner detail of foundation suspension, spring and snubber assembly

Foundation on Springs

Protects the Machine from the Plant

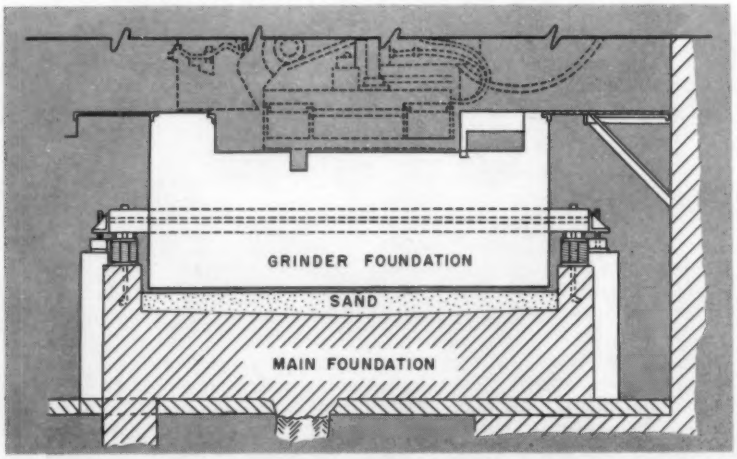


Fig. 2. Cross section drawing of grinder foundation shows component parts

REVERSING the usual problem of isolating a plant building from the shocks and vibrations of presses or other heavy machinery, Kaiser Aluminum & Chemical Corporation's Permanente Calif., foil mill had the problem of protecting a high precision operation from plant shocks.

The roll grinder for the plant's new 60-in. 4-Hi rolling mill is mounted on a floating foundation, consisting of a 235-ton block of concrete, suspended from the main building foundations on steel coil springs. Plant jars and vibrations are absorbed by the springs, permitting the grinder to continue its precision work unaffected by other activities in the building.

Permanente plant engineers felt the added protection of the suspended foundation was warranted in view of the extremely fine tolerances required in grinding and polishing mill rolls.

The foundation system, designed by Korfund Company, Inc., of Long Island City, New York, was completed in two stages. First the main foundations were poured in the shape of a solid block resting on bedrock with a recessed area at the top to receive the smaller grinder foundation.

Then, fourteen 10-in. steel beams to support the grinder foundation were placed across the recessed area and bolted to the isolator (spring) assemblies and to adjacent "snubber" assemblies. The snubbers consist of vertical bolts linking beam and compression plates on the foundation and are designed to act as a check on the springs should excessive motion or oscillation occur in the grinder foundation.

A shallow layer of sand was then spread over the bottom of the recession and building paper laid over it. Side forms were built and the concrete poured. When the concrete had set, spring assembly bolts were turned uniformly, gradually raising the grinder foundation clear of the sand and shifting its weight to the springs.

Each of the 28 isolator assemblies is made up of nine springs, each about 10 in. long and three in. in diameter.

The grinder foundation is 38 ft long, 15 ft wide and its maximum height is six and a half feet. All piping and other attachments linking the grinder to the rest of the plant are flexible, so as to transmit as little vibration as possible.

The grinder itself, manufactured by Cincinnati Milling & Grinding Machines, Inc., is of the traveling head type capable of resurfacing rolls up to 192 in. long and 36 in. in diameter. It is some 45 ft long, (overhanging its foundation by about seven feet), and weighs approximately seventy-five tons, imposing a total load of 310 tons on the isolator spring assemblies.

Fig. 1. It is necessary for the tapper to sit within three feet of burner. The ambient temperature in area would exceed safe limit if hot face of encompassing, semi-portable panel were not covered with 0.040 in. mill finish aluminum

Radiant Heat—
How to Shield the Industrial Worker from Exposure

By BRUCE E. BRENNAN, Supervisor, Engineering Data, Reynolds Metals Co.

RADIANT HEAT is small comfort to the metal worker facing a glowing molten metal charge in a furnace. The intense radiation from hot metal, refractories or flame causes discomfort and often serious burns.

Perhaps of greater concern though, are the indirect hazards or secondary effects such as accidents and low quality work caused by the inability of the worker to endure the burning radiation for the period of time necessary to complete a unit of work. The uncovered parts of the body—the eyes, face and hands—are affected by even moderately intense thermal radiation. Light cotton work clothing is sufficient to protect the body from moderate radiant heat but foundry and mill workers have long known the advantages to be gained from multilayer work clothes.

As the heat intensity increases, the protection offered by ordinary work clothes is inadequate for exposures of more than a few seconds and special shielding clothing or devices become essential to insure the comfort and safety of the worker and the retention of quality and reasonable rates of production.

Heat Transfer

To understand the function of protective equipment it is essential that the characteristics of heat transfer be analyzed briefly. Radiant heat travels through air in a straight line from its source, without heating the air and consequently without loss of heat, until it strikes a body. When radiant heat is intercepted some of it is absorbed by the body and causes an increase in the temperature of the object while some of it is reflected and radiates in a new direction. Black objects absorb most of the radiation that they intercept. White or polished metal surfaces reflect a high percentage of radiation.

Radiant heat that is reflected by an object does not heat the object. Highly reflective surfaces, therefore, will provide protection against radiant heat by reflecting most of the radiation and absorbing only a small amount. The absorbed radiation heats the body but the major part of the radiation is reflected and has no thermal effect on the reflecting surface. A major portion of the problem of shielding against radiant heat can therefore be solved by the use of highly reflective surface finishes.

Radiation in the foundry is primarily in the infra-red range. Infra-red radiation is emitted from heated metals—either molten or solid, from heated refractories, furnace surfaces and burning fuels. The reflectivity of polished metals is relatively high in the visible light range and increases sig-

nificantly in the infra-red range. Polished silver and copper reflect approximately 98 per cent of infra-red radiation while polished aluminum has reflectivity of about 95 per cent. White paints and other white finishes have high reflectivity in the visible light range but drop off rapidly in the infra-red wave lengths.

Heat Reflectors

Both visible light rays and infra-red rays produce sensible heat. Sunlight contains both visible light and infra-red radiation but the visible light is present to a high percentage. Thus clean white painted surfaces are somewhat more effective than polished metal in reflecting the sun's heat. An interesting application of this characteristic of white paint is found in the painting of the exterior top surfaces of some airplane cabins with white paint. Other airlines have apparently found the practice to be of doubtful economy because of the excellent infra-red reflectivity of aluminum surfaces combined with good visible light reflectivity.

Polished aluminum, silver and copper are all highly efficient reflectors of infra-red radiation. The efficiency of silver and copper falls off rapidly as the surface darkens, due to high temperature oxidation. Aluminum retains its high reflectivity with only minor loss due to aging and has the additional advantages of lightweight and availability in flexible foil thickness.

Aluminum foil laminated to a cloth backing, is very durable and easy to cut and apply to conventional industrial machines. The use of aluminum foil to reflect radiant heat solves about 90 to 95 per cent of the problem. Though small in percentage, the remaining 5 to 10 per cent is large in the quantity of heat that is absorbed by the reflecting surface.

There are three primary effects associated with the absorbed heat. The first effect is to heat the immediate area that intercepts the radiation. The local temperature rise of the material is inversely related to its specific heat. Aluminum has a relatively high specific heat, hence it is capable of absorbing a considerable amount of heat with a relatively low increase in metal temperature.

Secondly, the local heat is distributed throughout the metal surface by conduction, a characteristic that varies from metal to metal and material to material. Aluminum has high thermal conductivity, thus local heating is quickly distributed throughout the aluminum and hot spots or heat concentrations are quickly dissipated.

Finally, because the aluminum foil has been heated by absorbed radiation, it will emit or radiate its own heat. Emissivity for aluminum is very low, amounting to about 5 to 10 per cent at a temperature of 1000 F. Thus, there is little heat dissipated either inwards or out by the foil and the surface will become quite hot.

The problem in designing shielding garments is to prevent conductance of the hot surface temperatures to the body and this is accomplished by backing up the foil cloth laminate with low conducting materials such as asbestos, glass fiber or other similar substances. The use of a number of layers of materials creates air spaces which effectively lower the conductance of the complete garment.

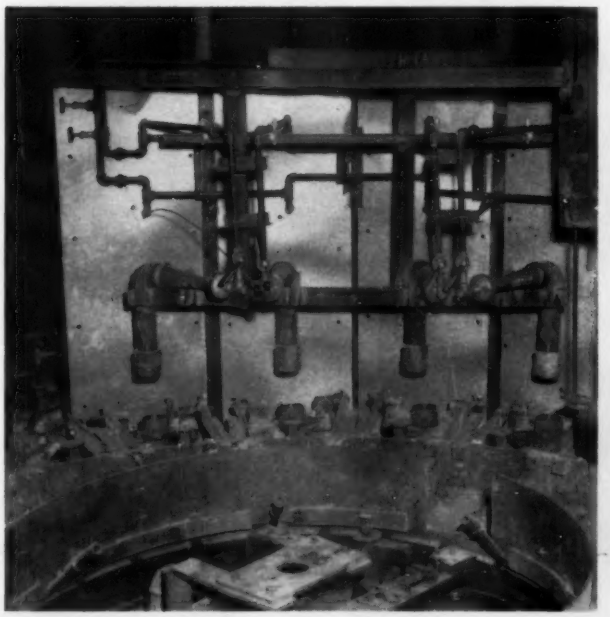
Protective clothing and shields worn or carried around intense sources of radiant heat can therefore make valuable use of an outer surface of aluminum foil backed by a lightweight, non-inflammable, low conducting material such as asbestos cloth.

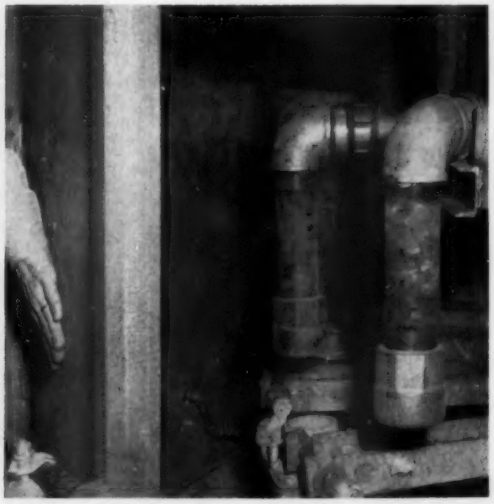
Early forms of protective clothing were primarily dependent upon a low rate of heat conduction through the material. While some reflective properties in the visible light range were gained by the white color at the surface, the materials had low infra-red reflectivity, low thermal capacity (specific heat) and relatively high emissivity. To be effective these materials were necessarily bulky and heavy and interfered with the workman's mobility.

Maximum Protection

For industrial use, the full suits are generally unnecessary although for jobs requiring work inside uncooled furnaces they would prove extremely valuable. Aprons, shields, vests, leggings and gloves are usually worn as required and provide a maximum of protection with a minimum reduction of the worker's mobility. Reflective sheets, blankets and tarpaulins permit easy portability and adaptability in setting up protective partitions.

Permanent installation of reflective insulation on the bottom surface of cranes and around control stations will provide appreciable protection to the operators and lead to safer and more efficient operating conditions.





Figs. 2 & 3. Left: Another view of the semi-portable panel is illustrated here. Tapper views operations from opening at right. Below: The shield against radiant heat makes it possible to place one's hand on back of shield within 24 in. of the hot burner flame

Fig. 1. Liquid latex is poured from giant frothing unit into molds from where it enters the curing ovens

Demineralized Water

Helps Goodyear Maintain Quality of its Rubber Products

By J. E. BURWELL, Airfoam Development Dept., Goodyear Tire and Rubber Co.

IN THE MANUFACTURE of Airfoam, at both the Akron, Ohio and Los Angeles, California plants of Goodyear, it is necessary to carefully control the materials that go into the natural and synthetic rubber latex during compounding. This is required to maintain high quality standards and reduce processing problems.

The rubber particles in the latex carry a negative charge and are therefore readily susceptible to coagulation in the presence of strong positively charged ions. The divalent ion such as calcium and magnesium, as well as zinc and iron, will tend to cause these rubber particles to coagulate prematurely. This not only affects the quality of the product, but if continued to any degree, results in processing difficulties and excessive waste.

For this reason, it has been our practice to use distilled or demineralized water as the base material for all compounding dispersions as well as for final dilution to control total solid content. When production of Airfoam was in its early stages, it was convenient to produce distilled water by condensing steam. However, as production grew to the stage it is at this time, it became readily apparent that the volume of distilled water from steam would impose undue hardship on the available steam producing facilities.

Softened Water Unsuitable

During the initial expansion in 1947-1948, the use of softened water was considered. However, information available at that time indicated that the softened water was not suitable since it merely converted the calcium and magnesium salts to sodium salts. While not as harmful to the process, the sodium salts were still considered undesirable and no action was taken at that time.

With the expansion of 1950-1951, the estimated consumption of distilled water was such that the Plant C (Akron, Ohio) power house facilities would be sorely taxed for production processing as well as steam for distilled water. At this time, we again contacted the manufacturers of water treating equipment and, after considerable discussion several demineralizer units were purchased. Costs and operating convenience were factors in our deciding to purchase this type of equipment for a critical operation.

With this equipment, we are able to continuously produce demineralized water free of not only calcium and magnesium, but also free of sodium salts and with a purity of three to five parts per million total dissolved solids.

Since the alkalinity of this water can also be controlled and the resultant product is iron-free, it proved to be water considerably higher in quality than we were getting from the existing equipment.

Two 28-in. diam units have been in continuous operation at Plant C since 1950 and similar units were selected for use in the Los Angeles plant.

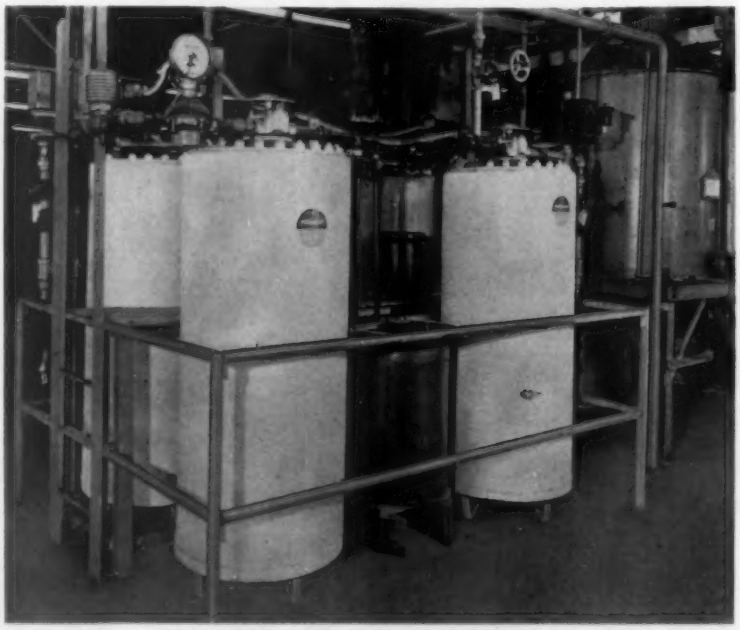


Fig. 2. Double unit demineralization plant at Akron. These 28-in. diam units produce enough water to provide all of the plant's production requirements

For more facts circle 568 on Reply Card ——→

REEL SAVINGS FOR YOUR PLANT

WAYNE *Production-Booster* HOSE REELS

STOPS PROFIT ROBBING ACCIDENTS—No suspension cables or coils of loose hose to trip over. Operator reels out only hose length needed, releases it like a window shade for automatic rewind.

ELIMINATES WASTE MOTION—Air supply and tool suspension are combined. Air tool is within easy reach at all times. Wayne Production-Booster Hose Reels increase output, reduce assembly costs, lessen worker fatigue.

SAVES HOSE . . . PROLONGS LIFE—Hose is always reeled up . . . cannot be walked on, crushed by industrial trucks. Hose lasts longer . . . maintenance and replacement costs lower.

EASILY INSTALLED in any position. Hose lengths 15′ to 50′.

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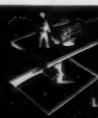
AIR COMPRESSORS



LIFTS

LUBRICANT DISPENSERS

INDUSTRIAL PUMPS

INVADER PUMPS

Troubleshooting In Action

Inspections at Armco plant help prevent accidents . . . Catch flaws before they cause trouble . . . This is done in several ways

Fig. 1. Magnetized particles helped expose this chisel crack

THAT OLD STATEMENT about the weakest link in the chain is given due consideration at the Armco Steel Corporation's Butler Works. Frequently seen about the plant is the man in the white hat who is responsible for checking chains in addition to crane hooks and tools.

One way that he makes sure about defects is to apply iron powder to a suspected section and use direct current to set up a magnetic field. The iron particles cling to any break. Another test makes use of dye penetration to reveal cracks. Then, of course, he relies on the visual check.

In the case of shafts, a reflectoscope can be used. This handy device works on the principle of "sound-rebound." Ultrasonic waves travel through the material and their behavior is observed on a graph.

Fig. 2. Stencils and tags transmit test, approval information

Fig. 3. Dye penetration is used for checking the crane hooks

Fig. 4. Ultrasonic test unit detects flaws in axles, castings

Fig. 5. Magnetic testing is done with the aid of portable unit

Here's the lowest cost

TRAMP METAL PROTECTION

ever offered...

...It's the New

DINGS

"Universal Series" METAL DETECTOR

The new Dings Universal Series Metal Detector will detect the presence of all magnetic metals in materials that pass through the Detector Search Coil. Metals are thus detected in material in any form, whether in raw or finished conditions, in bulk or pressed form, liquid or viscous, granular or fibrous state. Even weakly magnetic metals such as manganese steel can be detected by this new, adjustable intensity unit.

Extremely simple in design, installation and operation, the new Dings Metal Detector requires virtually no attention. It is merely necessary to plug the unit into any single phase outlet, place the Search Coil around conveyor belt, and turn on the switch . . . and you have provided protection against tramp metal damage to machinery and product quality at an extremely low cost.

DINGS ELECTRONICS, INC.
(subsidiary of DINGS MAGNETIC SEPARATOR CO.)
4766 W. Electric Ave., Milwaukee 46, Wisconsin

HERE ARE SOME OF ITS OUTSTANDING FEATURES

- Wide range of sensitivity settings
- Responds to manganese steel
- Remote location of control cabinet (30-ft. of cable furnished)
- Permanent stability (no adjustments necessary — not subject to temperature or humidity changes)
- Rubber-mounted search coil completely water-tight
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- Easily installed and operated, even by inexperienced personnel

Dings

Magnetic Separation Leader for over 50 years

MAIL THIS COUPON NOW

DINGS ELECTRONICS, INC.
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Please rush further details about the new Dings Universal Series Metal Detector.

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MD155

For more facts circle 569 on Reply Card

Electronics Help Precision Boring Machine Take Orders from Punched Tape

PUNCHED-TAPE principles of automatic operation have been applied to a precision boring machine used in the production of instrument gear trains.

Developed by Minneapolis-Honeywell Regulator Co., the system includes a standard four-spindle precision boring machine modified with built-in electronic controls and circuitry and a tape "reader" housed in a control cabinet.

Hold coordinates and feed instructions are punched on the tape by a perforating machine similar to a typewriter. Electronic signals from the tape regulate the linear travel of the boring machine's hydraulic cross slide and the rotary motion of a specially-designed holding fixture mounted on the cross slide.

Tape preparation requires approximately five minutes per hold and complete changeover from one part to another can be accomplished in about 30 minutes.

To set up automatic operation, the proper adapter ring is attached to the rotary fixtures, cutting tools are mounted in the four spindles and the punched tape is placed in the reader of the control circuit. After inserting a blank piece in the fixture, the operator presses a button to initiate the automatic tape-controlled cycle. After the machine has "read" the complete strip of tape, it automatically stops to permit removal of the finished part.

Different piece parts can be handled merely by changing the adapter ring and inserting the appropriate tape. Accuracy is better than plus or minus 0.0005 inches.

Vacuum Melting Furnace Provides New Source for Special Alloys

ADDING BETTER than 120,000 pounds per month of specialized vacuum melted alloys to the nation's capacity, a semi-continuous, 1,000-pound vacuum melting furnace has been placed in operation at Carboloy Department of General Electric Company.

Built by Consolidated Vacuum Corp., Rochester, N. Y., it is of the so-called modular type, designed so its operation can be expanded or curtailed, much on the order of building blocks.

By providing various chamber bottoms with suitable accessory equipment, single ingots, multiple-shaped castings or centrifugal castings can be produced from the same furnace. Semi-continuous operation is provided by interlocks through which the crucible can be charged, the alloying elements altered and the ingots removed without breaking the vacuum in the main chamber.

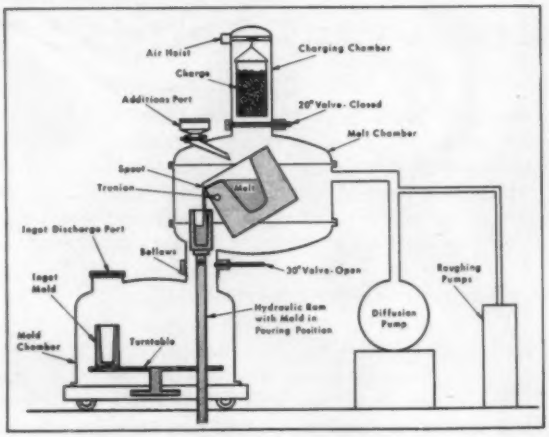
Three control panels make this centralized control possible. These coordinate all functions of the power and the air evacuating systems with those of the furnace itself.

One panel is used for power to balance out the capacitor banks of the 350 KVA motor generator set supplying power for induction heating. The second panel controls the vacuum system. Unusual feature of this panel is that it includes a schematic diagram of the vacuum lines tied in with indicating lights, so that the operator knows exactly what is happening at all times.

Smallest of the control panels is used to index the turntable on which the ingot molds rest, and controls the mechanism that raises the ingot molds up into the main section of the furnace chamber for pouring.

Three pumps are included in the air evacuating system, two roughing pumps and an oil diffusion pump. Of the two roughing pumping systems, the 500 cu ft Kinney is capable of handling the furnace operation alone. However, the addition of a 300 cu ft unit gives the furnace added efficiency and speed, and is used mostly for expelling air from various chambers as the operations demand.

Extremely low pressures are obtained with a third pump —an oil diffusion, 3-stage unit. Where the roughing pumps will get down to pressures of around 500 microns, the oil diffusion pump will take the pressure down to less than one micron.



The induction furnace used for melting is mounted on a trunnion inside a stainless steel tank. Power is introduced to the furnace by means of a coaxial arrangement, eliminating the use of flexible leads.

In getting the furnace ready for a typical vacuum melt, a lining or crucible is placed in the induction furnace. Charging then is done with special containers, filled with the desired metallic elements for the melt in predetermined amounts.

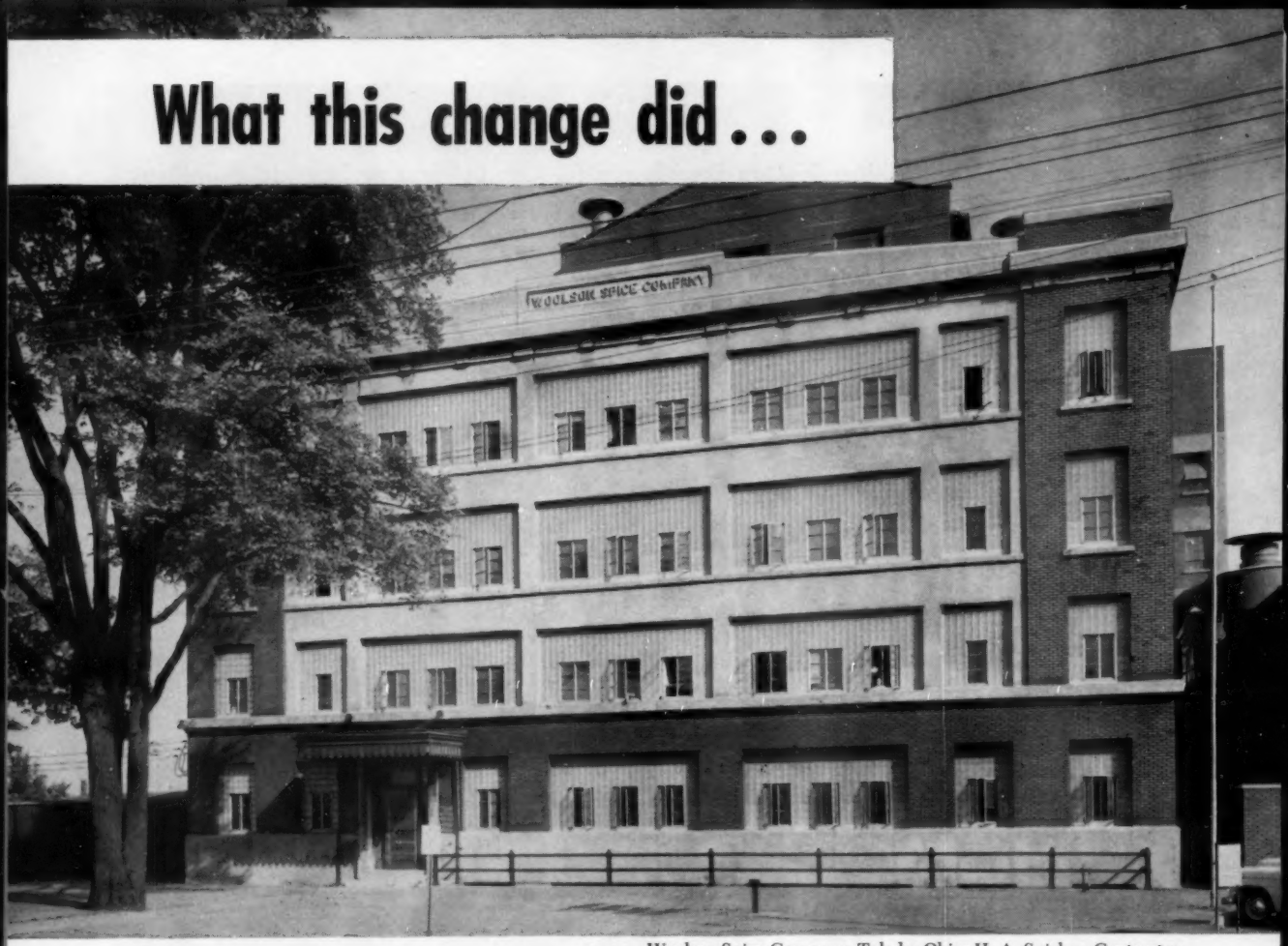
After the container is filled, it is placed in the charging chamber. At this point, the charging chamber is sealed and a roughing pump evacuates the air from the chamber.

When the pressure is down sufficiently, a pneumatically-operated, sliding valve under the chamber is opened, the charge is positioned in the crucible of the induction furnace, and the valve closed, to seal off the vacuum chamber.

Melting, which ranges in temperatures between 2800 and 3200 F, takes about one hour. Total cycle, including refining requires about five hours.

For more facts circle 570 on Reply Card ——→

What this change did...



Woolson Spice Company, Toledo, Ohio; H. A. Spieker, Contractor

"Owens-Illinois Glass Block* cut absenteeism because of colds 90%, reduced heating costs 40%, improved building appearance"

Here's what Mr. N. L. Schmid, president of The Woolson Spice Company, says about this installation: "In the Fall of 1952 our company replaced worn-out and unsightly window sash in our principal building with panels of Owens-Illinois Glass Block. The transition from the old to the new was without inconvenience; and, as a result of this remodeling, a careful check has shown that through eliminating drafts, *our absenteeism, because of colds, has been reduced ninety per cent.* Complaints from the stenographical unit ceased as to improper light. Economically, a very substantial saving has resulted in the reduction of the expense for heat. It is estimated by our General Superintendent that the *heat expense* item in our overhead has been *reduced forty per cent.* In addition to our satisfaction as to benefits from Owens-Illinois Glass Block, there also comes the pride in the *improved appearance of our building* that was so quickly changed from old-fashioned to a modern appearing structure."

BEFORE
Owens-Illinois Glass Block

N. L. SCHMID
President, Woolson Spice Company

If you are in the process of remodeling old structures or building new ones, don't overlook the positive advantages that panels of Owens-Illinois Glass Block bring. For information and help with your plans, write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. PE-1, Box 1035, Toledo 1, Ohio.

*Formerly known as INSULUX

OWENS-ILLINOIS GLASS BLOCK
AN (I) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

Incremental Air Conditioning System Developed for Use in New or Existing Buildings

A NEW METHOD of air conditioning, called the Remington Incremental System, has been developed by the Remington Corporation, for air conditioning multi-office buildings. It is called incremental because it can be installed in existing buildings in increments of one wing, one floor or one office at no extra cost over doing the entire job at one time.

The incremental system consists of four elements which are arranged so as to work together, namely: 1. The central steam or hot water heating installation, already in the buildings, but with the present radiators removed. 2. An adequate electrical system—in most cases this means extensive new wiring. 3. A new air conditioning unit called the Remington Consolaire Conditioning Convector, designed for year around use. 4. A system of control which gives complete and automatic control of year around indoor climate, yet prevents wasteful operation of each individual air conditioner when not required.

The heart of the incremental system is the conditioning convector. It is in the shape of an inverted L, and will be hung from the window sills. There are no legs to interfere with floor cleaning. Each convector consists of three major parts: The base convector itself, which houses the heating coil, a centrifugal fan assembly and the controls; a hermetically sealed, interchangeable "cooling chassis" of either ¾ or 1 hp, which slides in or out of the base convector; and the removable mahogany front which contains the adjustable discharge grilles and gives easy access.

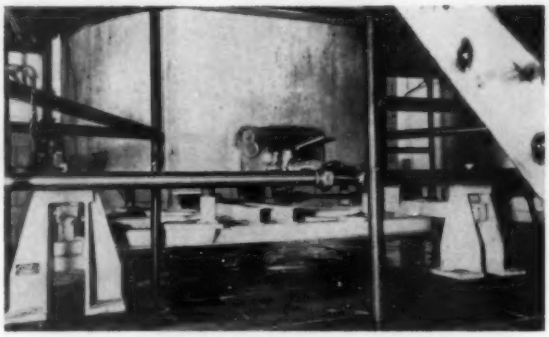
Weight Control Units Simplify Mixing of Food "Recipes"

A RECENT INSTALLATION of weight control units in the Wyeth Laboratories of Mason City, Mich., is cited as an example of what automatic weighing can do to increase production and lower costs.

Prior to the installation, Wyeth mixed its product by hand, weighing out each of the several ingredients and then taking them to the pasteurizer vat. Many times, final quality checks showed slight irregularities in formula strength, necessitating time-consuming stabilization of the formula.

The Lod Cap weight control unit, installed by Link Engineering Company of Detroit, Mich., is a completely new application of the air-balanced unit used by Link in solving tension problems in paper mills, adapted as a large, accurate and inexpensive weighing device.

The Lod Cap itself is quite simple and extremely durable. Inside the unit a formed diaphragm supports the entire weight of the platform and the weighing receptacle. Air pressure (minimum pressure required is 60 psi) is proportioned to bear against the opposite side of the diaphragm by means of a poppet valve and the weighing platform with its receptacle is automatically balanced to the applied load.



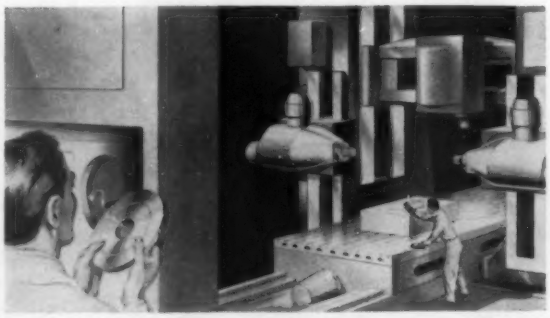
Once the operator has balanced the controller, and ingredients are placed in the 1,000 gallon pasteurizer resting on the weighing platform, a pressure is exerted upon the diaphragm in the Lod Cap unit. When pre-set loads are reached, controls will either automatically shut off the flow of one ingredient and start the flow of another or indicate when to do so manually.

Computer to Decipher Engineering Information, Pass It on to Huge Milling Machine

CAPABLE OF PRODUCING aircraft dies or parts of any shape within the second degree curves embodied in today's airplanes, a 200-ton electronically-controlled milling machine will be developed by Convair Division of General Dynamics Corp. under a $1,128,000 Air Force contract.

The machine's electronic system will read the numerical commands from engineering data fed into a computer. These commands, translated onto magnetic tape and run through an electronic director, will guide the machine's four cutting heads, its bed and turntable.

Convair's milling machine will differ from existing planers, boring mills and milling machines in that it will be capable of making 18 selective motions. The machine will have a 20-ft bed with 10-ft clearance; a rotary turntable; two vertical cutting heads, and two horizontal cutting heads. Cutting angles of the tools may be varied. Both the



vertical heads may be operated at once, or both horizontal heads. The machine will have a variable table speed.

New YALE Gas Truck speeds seat cushions to Canadian Pacific railway car at Budd Co.'s Red Lion plant in Philadelphia, Penna.

New Yale 2,000 lb. truck offers exclusive *fluid coupling*

SMALL, ALL-PURPOSE GAS TRUCKS ARE
SMOOTHER TO HANDLE, EASIER TO MANEUVER, LAST LONGER

YALE offers the *only* 2,000 lb. gas truck with Fluid Coupling. It enables these short trucks to take full loads easily along narrow aisles, around tight corners... extends clutch life up to 300%... minimizes wear on tires and floors... lowers maintenance costs... makes work less fatiguing for the driver. Also available in 3,000 and 4,000 lb. capacities, cushion or pneumatic tires, with versatile attachments to handle any type of material.

To lift, move or stack goods for your business, you can choose from YALE's complete line of gas, diesel and electric trucks. Call a YALE representative today for more details or mail the coupon below.

YALE* **INDUSTRIAL LIFT TRUCKS AND HOISTS**

*Reg. U. S. Pat. Off.

Gas, Electric, Diesel & LP-Gas Industrial Trucks • Worksavers Warehousers • Hand Trucks • Hand and Electric Hoists

MAIL THIS COUPON TODAY

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Roosevelt Boulevard, Philadelphia 15, Penna.

Please send me full information about YALE
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For more facts circle 571 on Reply Card

NOW
LUBRICATION FITTINGS
individually packaged
For protection . . . fast identification . . . saves time and waste
AND ONLY ALEMITE HAS IT!
Alemite, originator of the lubrication fitting—acknowledged leader in the field—now brings you individually packaged lubrication fittings in handy "strips." You buy as many as you need. They stay clean, undamaged. No more dirty threads, no more clogged fittings! And best of all, no more figuring which fitting is which—no more fumbling around in a box of miscellaneous parts for the fitting you need.
Furthermore, when you order genuine Alemite fittings now—you *know* you get the real thing, because only Alemite has this advanced packaging. Just as only Alemite brings you the design advantages of the original, genuine, Alemite lubrication fitting!
No more mixed-up fittings—keeps fittings separate—in handy strips.
You can identify fittings at a glance! Saves time yet costs no more!
Hermetically sealed against moisture, dirt—keeps fittings clean!
Look for this display on the counter at your favorite supplier
You *know* it's the genuine Alemite fitting when you buy it in this transparent plastic pack. Don't accept a substitute.
Genuine ALEMITE FITTINGS
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A PRODUCT OF SW STEWART WARNER

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"Janitors can be efficiency experts, too."

IF they follow this fellow's example. He knows that with a SUPER WESTONE treated mop he can control dust and beautify his floors — just as fast as he can walk.

SUPER WESTONE actually cuts the cost of floor care.

— loosens and picks up dirt more readily.

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SUPER WESTONE is *antiseptic*.

— arrests the growth of bacteria.

— helps prevent spread of airborne infections.

AND SUPER WESTONE is safe to use on any floor surface. No fire hazard exists, because it can be mixed with water. And no residual "build-ups" are left on floors.

A WEST representative will be glad to demonstrate. Without charge. Or send for our SUPER WESTONE folder.

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42-16 West Street, Long Island City 1, N. Y. *(Branches in principal cities)*
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☐ I'd like a free copy of your folder on controlling bacteria and dust with SUPER WESTONE.
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For more facts circle 573 on Reply Card

THE GLASS THAT HALTED A HOLOCAUST

LaSalle Street Fire

"As in most serious fires, exposed buildings were threatened by the raging fire in their midst. That these buildings were not involved is a tribute to the efficient work of the Chicago Fire Department and to the *effectiveness of wire glass windows in metal frames.*"

April 1951, NFPA Quarterly, published by National Fire Protection Association

Skylights of Coolite Wire Glass combine controlled daylighting, heat absorption and protection.

The distinctive pattern of Polished Misco Wire Glass, in metal frames, is ideal for window openings.

Polished Misco brings beauty and clean, functional, modern design to a proven safety standard.

Mississippi Wire Glass Affords Approved Fire Protection From Within or Without Your Plant

The roaring flames that reduced this structure to a smouldering ruin never spread to endangered nearby buildings. The holocaust was halted in its tracks with the help of wire glass windows in metal frames. Although heat cracked the lights, the woven wire mesh held the glass in the sash . . . prevented the blaze or errant embers from igniting new fires. The ability of Mississippi Wire Glass (Approved Fire Retardant No. 32) to remain in an opening after cracking or accidental breakage, makes it especially suitable for skylights, lot line windows, vertical shafts, partitions, doors or at any point where fire protection plus good daylighting is required.

Give your buildings the finest protection. Mississippi Wire Glass will not only prevent damage from exterior causes, it also tends to bottle up small, internal fires, keep them from spreading into costly conflagrations. Specify Mississippi wire glass, the original wire glass upon which the Underwriter's Standard was based, the standard today by which all others are judged.

Available in hexagonal or Misco wire mesh in types for clear vision or diffusion wherever quality glass is sold.

Write today for free literature.
Address Dept. 13.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. — NEW YORK • CHICAGO

SAINT LOUIS 7, MO. — FULLERTON, CALIFORNIA

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

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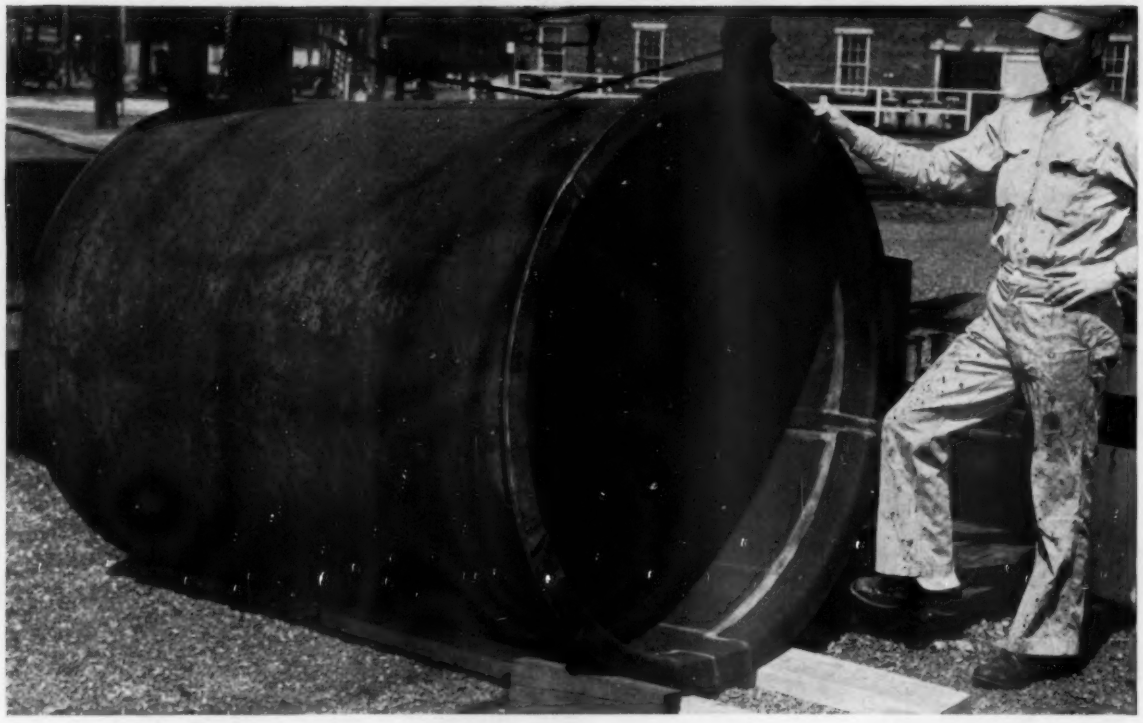

Tank linings of resilient Du Pont "HYPALON"® give maximum protection against strong oxidizing agents

NOW . . . linings of HYPALON, Du Pont's new chemical rubber, are commercially available for your use. Applied by standard lining methods for resilient materials, HYPALON tank linings can give much longer service on many critical applications. HYPALON is particularly resistant to deterioration from strong oxidizing agents. Chemicals such as chromic acid, sulfuric acid, pickling solutions and chlorine dioxide can be contained safely in equipment lined with HYPALON.

HYPALON is also more heat-resistant than any general-purpose elastomer, and it resists many of the other causes of failure in resilient materials. It won't crack from contact with ozone in any concentrations . . . withstands the effects of sunlight and weathering.

The tank shown above is used for storage of oxidizing solutions of calcium hypochlorite, and maintenance men have reason to expect a long, uninterrupted service life from the lining. Take a tip from them . . . when you need a tank-lining material that must have *extra-high resistance* to deterioration, try HYPALON chemical rubber. And be sure to ask your rubber-goods supplier about *all* the HYPALON products he sells. He'll be glad to show you the variety available.

USES FOR "HYPALON" INCLUDE:

HOSE—for handling strong acids and hot fluids

TANK LININGS—for storage of corrosive materials

GASKETS AND PACKINGS — for high-temperature service

PROTECTIVE COATINGS—over rubber, metal, wood, masonry

COATED FABRICS — for diaphragms, tarpaulins

MOLDED AND EXTRUDED PARTS — O-rings, tubing, miscellaneous parts

HYPALON®

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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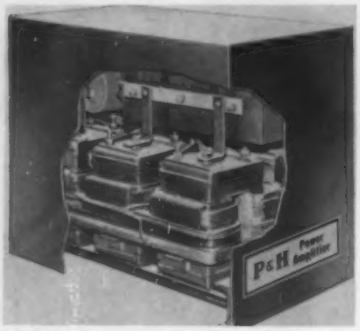
NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 165-166.

1—POWER AMPLIFIER gives variable d-c power

Announced as a simple, nonrotating source of variable d-c power, this new power amplifier is designed to provide variable speed, stepless control. In operation, performance can be likened to adjustable voltage systems, except that this amplifier has no rotating parts. Input



power can be any phase and voltage combination. The product is designed around durable transformers, saturable reactors and rectifiers, and is a self-contained unit. Control can be achieved electronically.

Advantages cited for this power amplifier include long service and low maintenance, and silent operation. Also, it is said to have a rapid response factor. Wide speed ranges are available with standard units, and higher ratios can be provided with special control. The amplifier comes in standard sizes from 1 through 30 hp, and is designed to supply variable d-c power to one or more motors up to its total capacity. Electrical Products Div., Harnischfeger Corp.

2—CONTAINER CAR designed to cut bulk rail hauling costs

This new type of railroad container car, recently announced by Shippers' Car Line Corp. and Tote System, Inc., is designed to let you ship bulk materials over long distances and still save substantial amounts. Key to the development is the construction of the car itself—28 separate, removable containers mounted and locked in place on a flat car, are classified

as an integral part of the rail equipment so that, for the purpose of freight charges, tare weight of these containers is not charged in either direction. Charges for returning the empty containers is nil, it is pointed out, and the owner or lessee of the car is credited with a mileage allowance for any distance the unit travels either full or empty.

In effect, this container car idea is both an inter-plant and an intra-plant handling system for bulk materials. When in place, the containers are the superstructure of the car; when removed they become portable discharge hoppers. A principal feature of the car is that the containers can be removed in minutes by fork-lift trucks. Plants not having a rail siding can take advantage of bulk shipments by receiving the car at the nearest railway yard. Here, says company, one man can transfer the 28 containers from car to truck in less than an hour. Also, the container car is adaptable for handling mixed shipments. Tote System, Inc.

3—REFRIGERATING UNITS for large capacity cooling

Absorption refrigerating machines which have no major moving parts and produce chilled water from hot steam are announced for large capacity air conditioning and process cooling installations in 11 sizes from 100 to 700 tons. These machines adjust automatically from full to virtually zero load with little loss in efficiency, says manufacturer, and are designed to produce low-cost cooling wherever an economical source of heat, such as natural gas, is available. They are also suitable when a source of steam is already available from the heating boiler, as a by-product of a process using steam.

Since the machine operates on low pressure steam, which may be obtained from back pressure turbines or exhausted from processing operations, it can provide chilled water for summer air conditioning or process chilling at little operating cost, it is pointed out. Due to its light weight and lack of moving parts the machine can be installed on roofs without special reinforcing, says company, and its vertical assembly occupies a minimum of floor space, which facilitates installation at intermediate floor levels or in the basement. It is also claimed silent in operation. Carrier Corp.

4—FIRE RETARDANT PAINT offers one-coat protection

Application of one coat of this fire retardant paint is reported to provide fire protection that meets Underwriters Laboratories' standards. The paint can be applied by brush, spray or roller methods to any type of surface—wood, steel, acoustical tile, fibreboard. When fire strikes the coated surface, the paint puffs into a thick, cellular mat which, according to manufacturer, not only resists the flame but insulates the surface from the passage of intense heat. When the blaze is extinguished, the black "mat" is easily scraped off and the surface is ready for repainting. The paint comes in a variety of colors. Albi Mfg. Co.

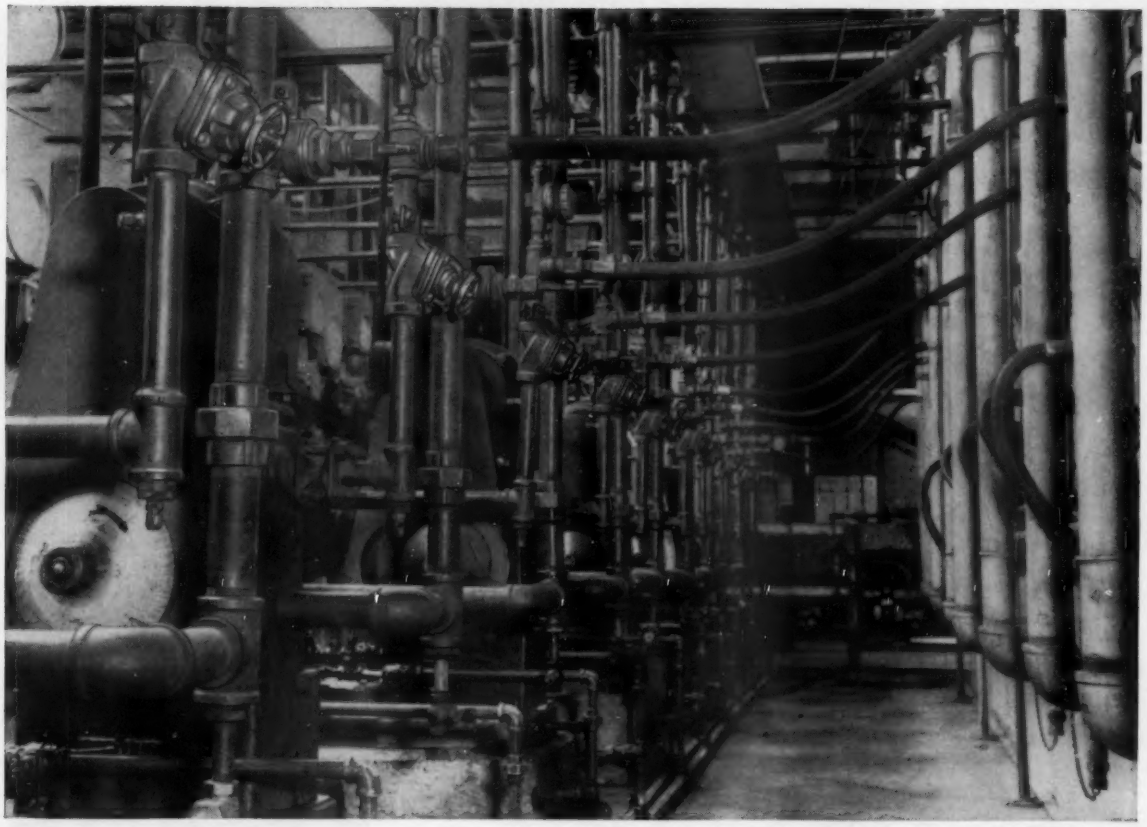
5—SAW-JOINTER with extra jointer capacity

This saw-jointer combination is designed for users of woodworking equipment who need the additional capacity of a 42.5-in. jointer bed. It combines company's standard 10-in. tilting table circular saw

and a long-bed 6-in. jointer, and represents an improvement over an older combination unit including the same saw and a jointer with a shorter bed. Chief advantages cited for the new combination machine are space savings, lower power cost, portability and handling simplification. The two component machines, mounted on a single stand, fit in a space 37.5 by 60 in., and they operate off the same motor. The unit is available in models set up for single-phase and three-phase operation. The saw cuts stock up to 3¼-in. thick and rips to the center of a 50-in. panel. Delta Power Tool Co., Rockwell Mfg. Co.

6—SINTERED CARBIDE for many steel cutting jobs

K-21 is a multi-purpose sintered carbide steel-cutting material designed for increased productivity on both high- and low-speed machines through wide ranges of application. It has a Rockwell A hardness of 91.5 plus high transverse rup-



Holding high vacuum with low upkeep is routine for these CRANE VALVES

At the Crosley & Bendix Home Appliance Divs., Avco Mfg. Corp. refrigerator plant at Richmond, Ind., a line vacuum within a few microns of absolute is applied to a dehydration process. But holding this vacuum wasn't always a routine operation.

There was a time when frequent valve failures caused production losses and costly maintenance—stopped only when Crane Packless Diaphragm Valves were installed.

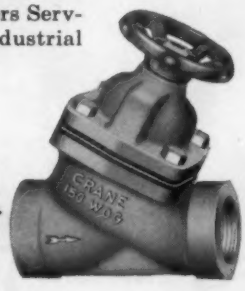
Of the valves formerly used, a multiple metal diaphragm type lasted about 3 months. Crowning of diaphragms caused restriction or closure and made the valves inoperable. Damaged diaphragms meant complete valve replacements.

In other valves, in-leakage at the diaphragm-to-stem connection made them unsatisfactory.

Now in service more than a year, none of the Crane Kel-F Diaphragm Valves has needed any maintenance. Crane simplified construction, giving a longer-life diaphragm...tighter bonnet seal and seating . . . and easier operation . . . is the reason.

The diaphragm in Crane design has longer life because it seals the bonnet only—is not subject to the cutting and crushing encountered when also used for seating. The separate, positive seating disc controls fluid even should diaphragm fail. Wide selection of body materials and trims. Ask your Crane Representative for Circular AD-1942.

Crane Co., General Offices: 836 S. Michigan Ave., Chicago 5, Ill. Branches and Wholesalers Serving All Industrial Areas.



CRANE CO.

VALVES • FITTINGS • PIPE
KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY...1855-1955

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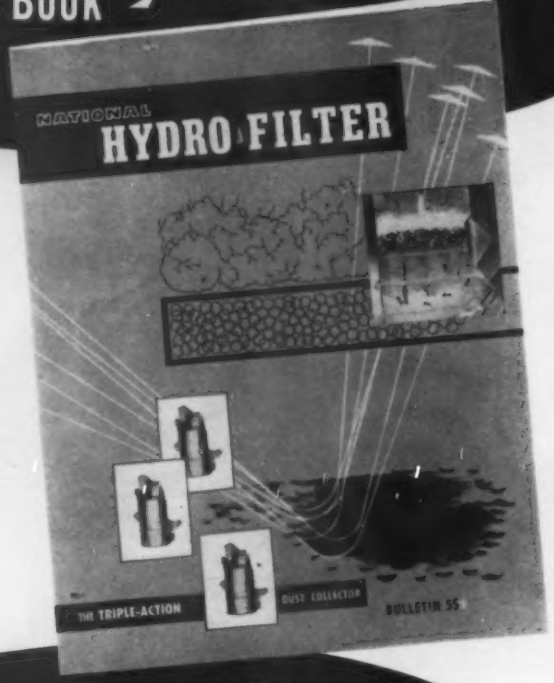
Here is the Book that describes an entirely new concept of dust control!



Here is the Collector . . .

that takes advantage of the most effective dust control principle known to man—that of simple filtration. In so doing it will promise three advantages, sought for wherever dust control or maintenance of wet type dust collectors is a problem:

EASE OF MAINTENANCE No moving parts to corrode.

CONSTANT EFFICIENCY over wide variations in load; —self cleaning on 24 hr. basis.

EXTREME SIMPLICITY makes it a tool that is easy to understand, operate and maintain.

WRITE FOR BULLETIN 55 today!

Details on operating principle, the 14 (500 to 25,000 cfm) models available and a record of test results with the Hydro-Filter are included.

NATIONAL HYDRO-FILTER Dust Collector Corp.

604 Machinery Hall Bldg., Chicago 6, Illinois

Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

For more facts circle 577 on Reply Card

NEW PRODUCTS

(Begins on page 130)

ture strength, says company, and was developed for general cutting, heavy roughing and finishing of steel products with a range broad enough to get the most out of today's high-speed machines, as well as step up productivity on older, slower machines.

K21's outstanding characteristics are announced as high-edge strength, combined with excellent wear qualities and resistance to cratering. It is said to possess high hardness and to be particularly effective on plunge and interrupted cuttings of castings having sand inclusions and hard spots. Manufacturer also reports good performance on lighter cuts. The new material is stocked in blanks, tools, inserts. Kennametal Inc.

7—PLATFORM TRUCK carries two skids at once

Quicker skid handling is possible with this dual lift platform truck; it can transport two trucks simultaneously. The 4000-lb capacity hydraulic electric truck

is fitted with two independently operating platforms which can be separated to a vertical distance of 62 in. The upper platform fits over the lower one in its lowered position, giving the appearance of a single platform lift truck. Dimensions of the upper platform are 69 by 24 in.; of the lower one, 53 by 21½. The former provides a free lift of 35 in. with a maximum of 69, while the lower platform can lift a skid 4½ in. Each can handle a 2000-lb load. Overall height is 60 in. The Yale & Towne Mfg. Co.

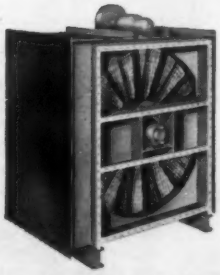
8—CONVEYOR BELTS for heavy duty installations

Two high tension conveyor belts constructed with new synthetic fabrics are announced for heavy duty use on long center and high lift installations. High Load and Haul King Belts are designed to offer advantages of light weight with high strength and they carry working tension ratings up to 110 lb per inch per ply. High Load is suggested for extra heavy service and Haul King for general heavy duty in high tension, high stress applications. Both types are available with fabrics of either all rayon or treated cotton warp with nylon filler.

According to manufacturer, these belts have high strength-to-gage ratios and

in one package

big-unit fuel economy for small boilers!



That's the way you receive the Package Ljungstrom. The entire self-contained unit arrives fully-assembled and ready for installation.

Now, with the Package Ljungstrom® Air Preheater, even boilers as small as 25,000 pounds of steam per hour can operate at big-unit fuel efficiencies. Compact and self-contained, the packaged unit operates in the same way as the larger Ljungstrom units so widely used by large industries and utilities—waste heat is absorbed from flue gas by the rotating surface . . . transferred to incoming combustion air by the same surface . . . and funneled back to the furnace—reducing your fuel costs 1% for every 45-50° of preheat.

Find out how the efficient, low-cost Package Ljungstrom Air Preheater can be applied to your steam-generating units. Write, today, to The Air Preheater Corporation.

The Air Preheater Corporation 60 East 42nd Street, New York 17, N. Y.

For more facts circle 578 on Reply Card

STOP VIBRATION

with

KORFUND VIBRATION CONTROL

At the ***Western Electric*** Kearney, N. J. works, six of these Bliss High Production Presses are stamping precision parts for telephone switchboards. Even at speeds up to 300 s.p.m., tolerances are held within .002" in progressive dies. Korfund Vibro Isolators are used as mountings for these presses which are located on both the ground and second floors in a blanking area. The mountings were installed to reduce the possibility of cumulative rhythmic vibration which might adversely affect the performance of any or all of the machines in the area; also to reduce noise between floors.

Korfund Vibration Control has paid off in dollars and cents for thousands of manufacturers, because Korfund units reduce transmitted vibration and:

- Permit more efficient plant layouts
- Decrease original building and foundation costs
- Permit installations without reinforcement of floors
- Reduce rejects, improve work quality
- Reduce maintenance costs
- Lengthen building and machine life
- Increase machine speed and production
- Insure quieter unit operation—less operator fatigue

We'll gladly send more information on Korfund Vibration Control for presses, machine tools, hammers, compressors, and other mechanical equipment. Write today for your free copy of Bulletin #1, or see our catalog in Sweet's Files.

For specific recommendations, contact us or your local Korfund office. A half century of experience is at your disposal.

THE KORFUND CO., INC.

48-35R Thirty-Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

For more facts circle 579 on Reply Card

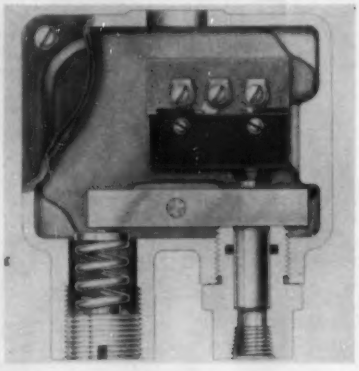
NEW PRODUCTS

(Begins on page 130)

high strength-to-weight ratios resulting in thinner and lighter construction; this permits longer centers, heavier loads, lower horsepower drives and smaller pulley diameters. Reduction of longitudinal carcass breaks from impact stress is attributed to the greater strength of these new fabrics. They are also claimed to have greater transverse flexibility, and be more easily handled. Boston Woven Hose & Rubber Co.

9—PRESSURE SWITCH for high speed metal working

This piston type switch for high speed, automatic, heavy metal working duty, it is announced, senses any system pressure over an adjustable range of 35 to 12,000 psi with a proof range of 4500 to 20,000 psi. A sealed piston simplifies installation



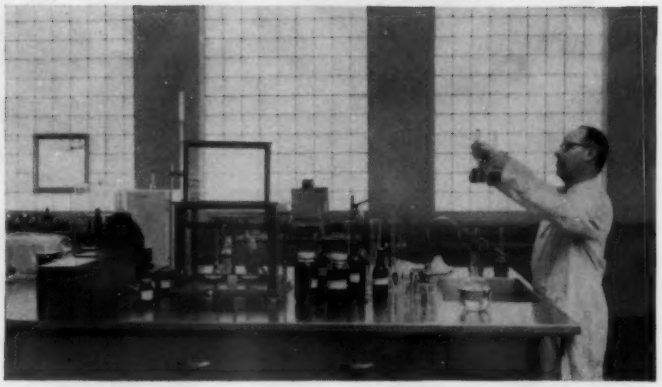
and eliminates need for drain return piping. According to manufacturer, this switch can be expected to perform millions of cycles under fast, continuous operation; and generous piston travel presents undesirable actuation from line surges, jarring or vibration.

The switch is designed to actuate an electric circuit at any predetermined point on increasing or decreasing pressure. The fixed actuation valve varies from 15 to 1000 psi. There is an external adjustment screw for field setting which is locked in place. The switch incorporates a single-pole double-throw snap action element for a-c or d-c use. Barksdale Valves.

10—PIPE INSULATION is for -120 to 250 F

Fiberglas White Dual Temperature Pipe Insulation is reported to combine maximum insulating efficiency and condensation protection for lines operating at low temperatures or at alternating cycles of high and low temperatures. For temperatures from -120 to 250 F, this product includes a factory-applied vapor barrier designed to prevent condensation and provide an attractive white, slightly crinkled surface. The insulation is made of fibrous glass bonded with a thermosetting binder and the jacket is a five-ply laminate including an asphalted Kraft

ANOTHER PLANT MODERNIZES WINDOWS . . . CUTS COSTS!



"$1050 saved the first year with PC Glass Blocks"

says **Myron J. Hess,** *General Manager, S. Twitchell Company, Camden, N. J.*

This is the story of a small, highly reputable manufacturer who was faced with the necessity of air conditioning his building. He ended up with not only air conditioning, but with completely modernized windows—*both for less than the air conditioning alone would have cost.*

Air conditioning was going to be a major investment, but it was discovered that by replacing the old windows with PC Glass Blocks*, the size of the air conditioning unit could be reduced from 20 to 15 tons—an immediate savings of $2800.

Other costs would also be avoided by modernizing the windows with PC Glass Blocks. To repair the existing sash would cost $2000. Window breakage cost $1000 per year, while glass blocks are seldom broken. Window washing, not needed with glass blocks, cost $250 per year. Now add it all up:

Cost of PC Glass Blocks		*$5000*
Less *savings on air conditioner*	*$2800*	
savings on sash repair and breakage	*3000*	
savings on washing	*250*	*$6050*
First year's direct savings with PC Glass Blocks		*$1050*

In addition, steam pressure in winter was reduced from 7 pounds to 2 pounds because of the better insulation*. Window blinds, glare and dirt were eliminated. And it is estimated that employee efficiency is up 15%.

PC Glass Blocks can fit into *your* plant modernization plans, too. Write for our booklet, "How To Modernize Old Windows." Address Pittsburgh Corning Corporation, Dept. PG-75, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor St. W., Toronto, Ontario.

**"PC Glass" Blocks have twice the insulating value of ordinary windows.*

PC Glass Blocks

PITTSBURGH ® PC CORNING

ALSO SKYTROL® AND FOAMGLAS®

For more facts circle 580 on Reply Card

Darts Won't Leak NOW or LATER!

This True Ball Joint Makes the Difference

You expect a new union to give service. But what of next week, next month, next year? You can count on *each* Dart you install *today* to be leakproof. Yes and even after you use 'em over and over (they go on and off easily) they'll still give you a drop-tight seal because the seats are built to remain unscarred. Figure what you save in time and money with this type of equipment!

QUICK FACTS

- Leakproof because precision-machined to a true ball joint and spherically ground
- Nut and body practically indestructible. They're air refined, high test malleable iron.
- Extra wide seats of bronze alloy resist pitting and corrosion
- Heavy shoulders take severe wrenching in stride
- ALSO — EACH DART IS INDIVIDUALLY VACUUM-TESTED — ABSOLUTELY TIGHT WHEN IT LEAVES THE FACTORY

DART

UNIONS

DART UNION COMPANY • PROVIDENCE 5, RHODE ISLAND

The Fairbanks Company, General Distributing Agents:
Boston • New York • Pittsburgh • Rome, Georgia

For more facts circle 581 on Reply Card

NEW PRODUCTS

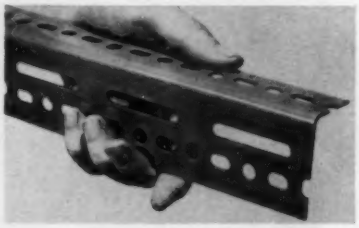
(Begins on page 130)

paper for the inner surface, a bleached Kraft paper for the outer surface, the two enclosing a 0.001-in. thickness of aluminum foil.

This jacket, company points out, has a vapor transmission rating less than 0.01 perms, which helps prevent condensation on piping. The insulation fits standard sizes of pipe to 33 in. and copper tubing to 6 in. For pipe sizes up to 12-in. diam, the insulation is furnished in hemicylinders with the vapor barrier attached. For larger pipes, it is supplied in three segments to 28 in., and in seven segments to 33 in., and the jacket is applied separately. The insulation comes in four nominal thicknesses of 1 to 2½ in.; is fastened in place with metal bands. Owens-Corning Fiberglas Corp.

11—FRAMING MATERIAL is easily installed

Dexion 225-80 Slotted Angle measures 2¼ by 1½ by 0.080 in. and is interchangeable with manufacturer's original slotted angle framing material. It is made from cold rolled steel with an electro-galvanized finish. In addition to lengthwise slots, present in the original design, the new angle incorporates round



holes and transverse slots at 3-in. intervals in both legs. The ⅜-in. diam round holes give positive bearing for bolts, it is explained, and the transverse slots permit overlapping and splicing for greater length, or nesting for additional strength and rigidity.

A wrench and hacksaw (or Dexion cutter) are the only tools needed for assembly. Diamond shaped cutting marks, spaced at 3-in. intervals, simplify measuring and cutting. When the angle is cut on these marks, slots and holes are in alignment for bolting. Slotted angle structures can be dis-mantled and the pieces re-used. Dexion Slotted Angle is supplied in packages containing ten 10-ft lengths of angle and 75 nuts and bolts. Also available for use with this material are 6-by-36 steel panels for building shelving, stair treads, and rigid and swivel casters for carts, other movable equipment. Acme Steel Co.

12—TAR-BASE COATING protects asphalt surfaces

Tarcote is announced as a tar-base coating for asphalt surfaces which checks the destructive effects of frost action, actinic rays of the sun, oxidation, acids, salts, alkalies and petroleum products. Tarcote

No other drive does all these jobs like

Link-Belt SILENT CHAIN

YES, if you need a drive like any one of these six, you're money ahead with SILENT CHAIN

COMBINING the flexibility and quietness of a belt with the positive action and durability of a gear — Link-Belt Silent Chain offers unmatched advantages for a wide range of drives. Check these reasons why:

- Lower cost—often lower in first cost, always lower in ultimate cost.
- Longer life — trouble-free performance for 25 or 30 years is common.
- No dismantling machine or removing sheaves for repairs.
- Better than 98% efficiency.
- Maintained ratio assures full productive capacity.
- Slipless action assures a better product.
- Easy to install.
- Safe to employees — operates in oil-retaining casing.

New 88-page Book 2425 gives complete data on silent chain. Ask a Link-Belt engineer or distributor for your copy today.

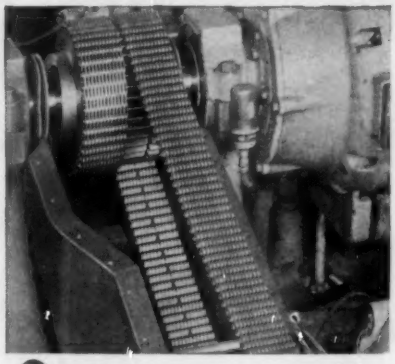
LINK-BELT

19,802

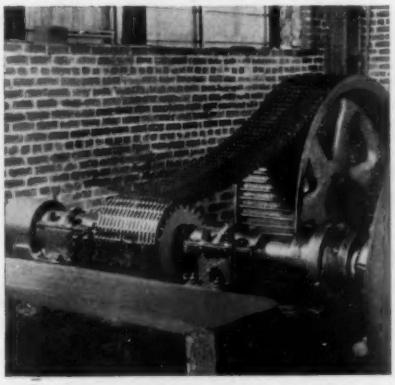
SILVERSTREAK
SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

1 **Production increased 33%** when speed of this peeler lathe was stepped up by installing two silent chain drives. Neither engine nor lathe had to be moved.

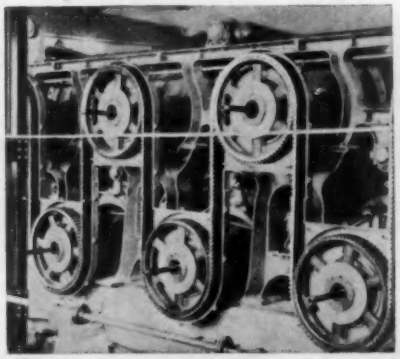


2 **Constant, high speeds** were assured by equipping each of 48 automotive test stands with two Link-Belt Silverstreak Silent Chain Drives.

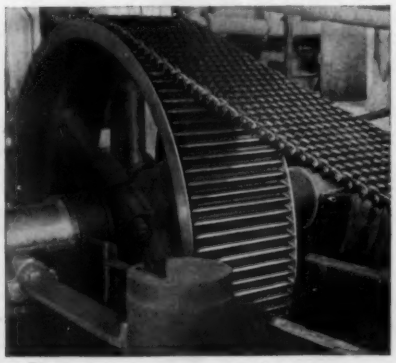


3 **Long life under severe service**—This 250-hp Link-Belt Silent Chain Drive has operated line shaft in cold draw section of seamless tube company since 1916.

4 **Fractional hp drives** are positive and dependable with Link-Belt Silent Chain. Above, two $\frac{3}{16}$" pitch chains drive machine fabricating refrigerator parts.

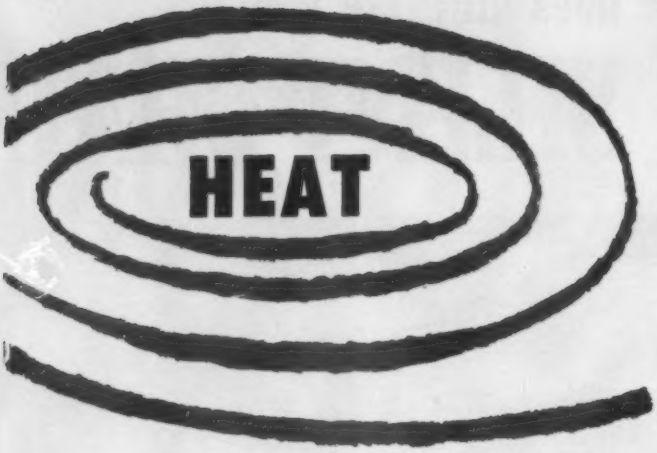


5 **Accurate timing** is guaranteed for this dryer by Link-Belt Duplex Silent Chain. All shafts travel at uniform angular velocity, permitting precise coordination of process.



6 **Minimum maintenance**—This is one of 24 Link-Belt Silent Chain beater drives in a pulp mill. All have operated for many years with little attention.

For more facts circle 582 on Reply Card



. . . may be the "trouble" with your electrical system

Are you troubled with nuisance power interruptions, insufficient branch circuit capacity, motor burnouts and the accompanying costly production delays? You will probably find that *heat* affecting your protective electrical equipment is the heart of your trouble.

You can eliminate heat considerations, however, simply by replacing with HEINEMANN Circuit Breakers.

HEINEMANN Circuit Breakers do not employ thermal elements or heaters of any type. Thus, their current carrying capacity and all set tripping points are completely independent of ambient temperature . . . unaffected even by nearby furnaces, steam pipes or cold drafts. HEINEMANN Circuit Breakers do not require de-rating. With HEINEMANN, 20 amperes means 20 amperes of usable capacity without needless tripping.

HEINEMANN Circuit Breakers operate on a hydraulic-magnetic principle. They provide inverse time delay to allow starting inrush or harmless, temporary overloads . . . yet they provide the fastest circuit interruption available on large overloads or short circuits.

GET THE COMPLETE FACTS: Send for your copy of "WHAT YOU SHOULD KNOW ABOUT CIRCUIT BREAKERS". Ask for Manual 101.

HEINEMANN ELECTRIC COMPANY
128 Plum Street • Trenton 2, New Jersey

HEINEMANN Circuit breakers

For more facts circle 583 on Reply Card

NEW PRODUCTS

(Begins on page 130)

is applied cold, with brush, squeegee or heavy duty spraying equipment. It contains no solvents or harmful toxic ingredients, manufacturer points out, and can be applied directly from the container, with no additives or mixing required. It is suggested as a protective coating for parking lots, driveways, runways, platforms. Bitucote Products Co.

13—HOPPER CHUTE helps increase work output

Addition of a hopper chute to this company's Flow-Matic line of materials handling equipment is announced. With it, the operator can deposit the finished piece with the same motion that he selects

the next piece to receive work. Depending on the operation, this new chute is said to enable a production worker to increase his output from 10 to 30 per cent. This also means that less floor space is required for handling equipment at each station and instead of two setups, only one is required. The large size hopper holds sufficient amount to keep operator going during box change. The container has a sliding panel door that automatically opens as box is set onto stand, discharging contents into hopper. The Powell Pressed Steel Co.

Use the Reader Service Cards provided on pages 165-166 to ask for more information on these products. Circle item numbers of products in which you are interested.

14—SEMI-DIRECT FIXTURES for industrial lighting

This semi-direct line of fluorescent fixtures is introduced for use wherever seeing tasks are critical and for general illumination where good lighting is important. According to company, the new line provides for a minimum efficiency of 82 per cent and an upward light component of approximately 25 per cent. Available in 4- and 8-ft lengths, the fixtures can be had in both rapid and instant start. The one-piece reflector shield is fabricated from vitreous steel with a porcelainized finish. Slots in the

WHAT HAPPENS NEXT?

If management has been wise, a fire tragedy will be stopped before it starts...if not, in 20 minutes extensive destruction and total loss could readily be the result.

First-rate fire protection is essential to the continued success of any business. With C-O-TWO Smoke or Heat Fire Detecting Systems, plus C-O-TWO High Pressure or Low Pressure Carbon Dioxide Type Fire Extinguishing Systems, as well as PYRENE Air Foam Type Fire Extinguishing Systems for specific outdoor locations, your plant can have fast, positive round-the-clock fire watchman service simultaneously at each fire hazard point . . . a fire tragedy is stopped before it starts.

Furthermore, there is a personal sense of responsibility inherent with PYRENE—C-O-TWO Fire Protection Engineers that assures you of fully adequate firesafety . . . a definite plus in your behalf. Whether it's fire detecting or fire extinguishing . . . portables or built-in systems . . . PYRENE—C-O-TWO means top quality backed by experienced engineering that results in operating superiority for you at all times.

Act now . . . don't take unnecessary chances with your investment any longer . . . the extensive experience of PYRENE—C-O-TWO over the years is at your disposal without obligation. Remember . . . a plant-wide fire protection survey skillfully executed today could be the means for greater profits tomorrow.

Pyrene

PYRENE — C-O-TWO

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

C-O-TWO

COMPLETE FIRE PROTECTION

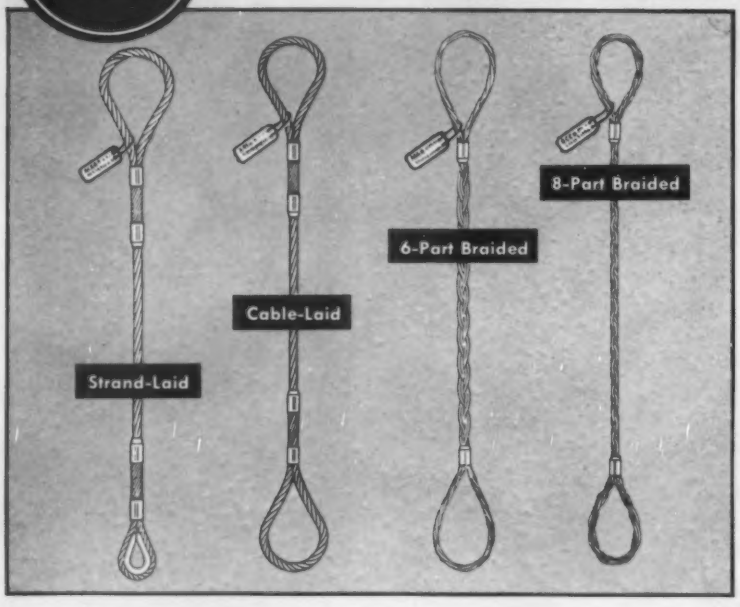
portable fire extinguishers . . . built-in fire detecting and fire extinguishing systems

CARBON DIOXIDE • DRY CHEMICAL • VAPORIZING LIQUID • SODA-ACID • WATER • CHEMICAL FOAM • AIR FOAM

For more facts circle 584 on Reply Card

ACCO products

ACCO Registered* Wire Rope Slings



4 Basic Types for All Uses

• These four basic types give you the right sling for any kind of service. Each incorporates the extra safeguards which make ACCO *Registered** the safest slings you can buy.

Each component is first individually tested—must prove to have strength at least equal to the sling body. After precision assembly according to carefully engineered designs, each completed sling is individually proof-tested at twice the load-carrying capacity for which it is rated.

Your guarantee of these extra safeguards is the coveted ACCO registration certificate and metal tag. You'll find it on each of these four types of ACCO *Registered** Slings:

Strand-Laid—Characterized by greatest strength for any diameter and weight, greatest resistance to cutting, crushing, and abrasion. Have ACCO DUALOC endings. For bridle or choker slings, applications where strength is at a premium.

Cable-Laid—Combine the strength of steel with the flexibility of manila rope. Special construction gives extreme flexibility, freedom from crankiness, resistance to kinking. Have ACCO DUALOC endings. For all applications requiring extreme flexibility and freedom from crankiness.

6-Part Braided—Provide wide bearing between sling and load. Combine extreme flexibility and freedom from crankiness with high resistance to cutting and lowest strength loss under severe bending. For applications requiring extra precautions against slippage or marring surfaces on load, or involving extremely sharp bends.

8-Part Braided—Sling bodies are free from internal stresses for maximum ease of handling, extreme flexibility in all planes. Give highest resistance to spinning under load, low strength loss under severe bending. For applications requiring maximum protection against loads spinning, or extreme flexibility in higher strength slings.

• Get the details on ACCO *Registered** Wire Rope Slings from your distributor or call the nearest ACCO district branch below.

FREE SLING NOTEBOOK
Fifty-six page booklet includes data on sling use, tips on sling care, rated capacity information on all types of wire rope slings.
Write today for your copy

ACCO

Wire Rope Sling Department
AMERICAN CHAIN & CABLE

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

Better Value

For more facts circle 585 on Reply Card

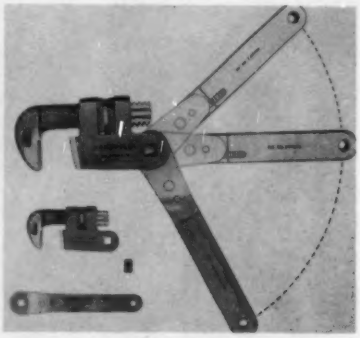
NEW PRODUCTS

(Begins on page 130)

unit provide a chimney effect to let air flow carry away dust particles. It is pointed out that because the reflector shield assembly is a single 4-ft unit, one man can service either the 4- or 8-ft length. Sylvania Electric Products Inc.

15—PIPE WRENCH lets you work in tight spots

By means of a simple ratchet principle, the Handi-Flex Pipe Wrench "bends" to allow for adjustments to fit tight places. In addition, this wrench can serve as a conventional ½-in. ratchet wrench. For this, you simply remove a pin separating



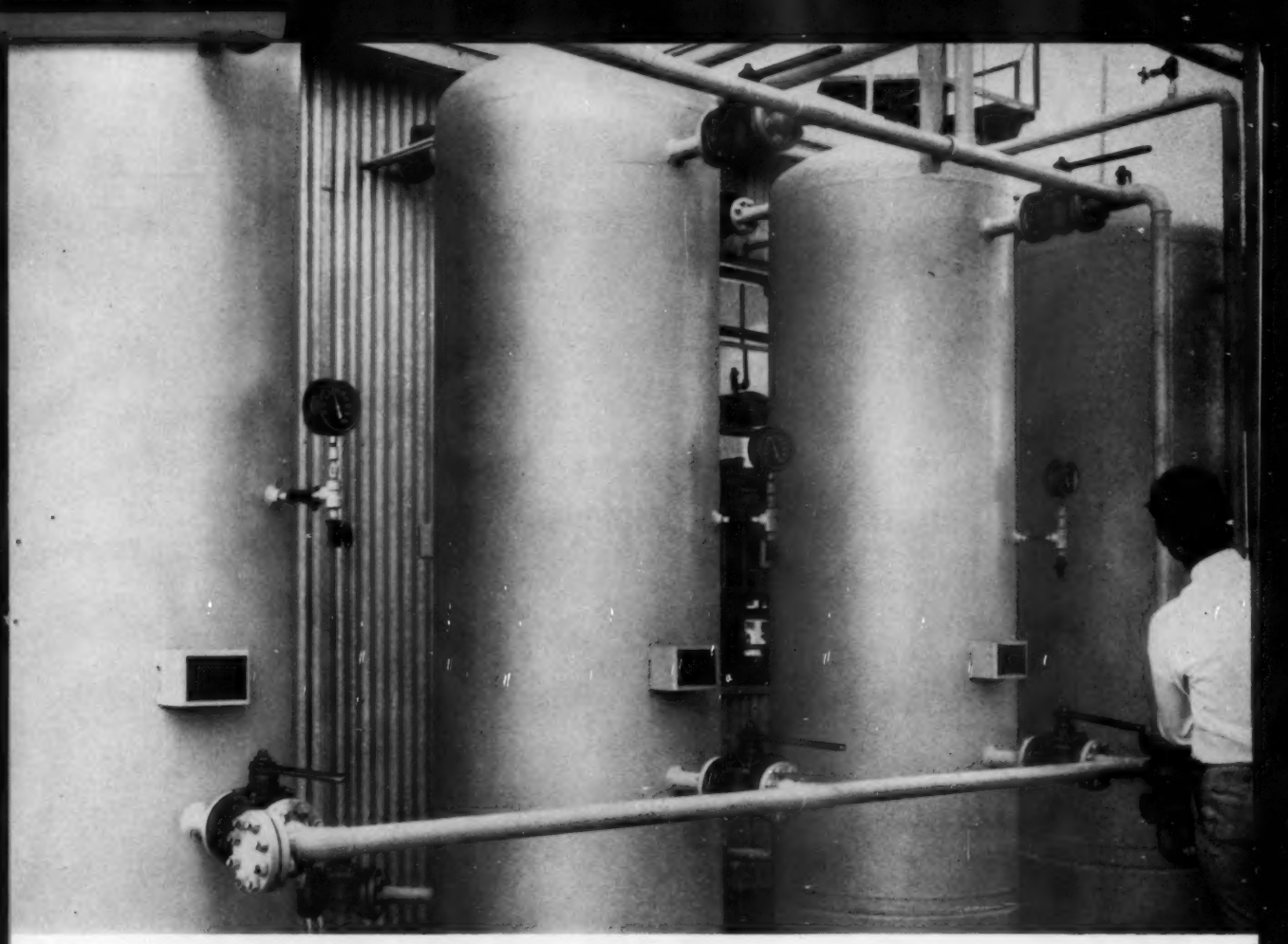
the head from the handle. By separating the handle, it is also possible to utilize interchangeable jaws. Manufacturer of the Handi-Flex says the principle involved provides for maximum torque because a firm "bite" can be made before the position of the handle is determined. The jaws of the wrench can be placed around the pipe, a solid bite taken, and the handle then moved to a good pulling position; and by this same method, a pumping action similar to a ratchet wrench can be used. The tool will cost around $8.00. Tedd Products Co.

16—FLOOR MATERIAL for use directly over concrete

Coro-Crete is announced as a corrosion-proof floor material which provides increased protection from attack by alkalis, solvents and acids. For application directly over concrete, the material is composed of three basic ingredients: a thermosetting resin liquid, a hardening agent, and an aggregate-type filler. It has been developed for the chemical, food processing, plating and metal working industries, and is mixed at the job site for immediate application. Manufacturer says Coro-Crete can be used in instances where many coating membranes will be destroyed by solvents.

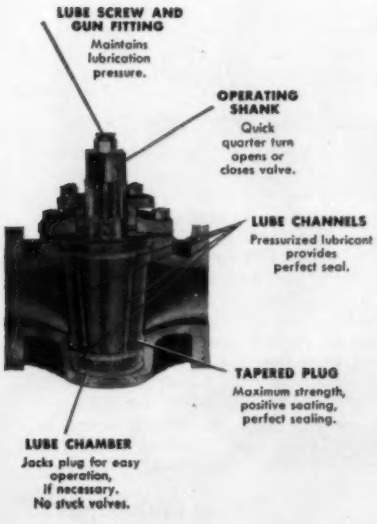
Coro-Crete is said to handle like cement topping and is applied in thicknesses from ¼- to ⅜-in. per layer. It cures in a few hours to a dense, impermeable and non-dusting surface, according to company. Coro-Crete is suggested for both existing and new concrete floors.

For more facts circle 586 on Reply Card→



Find out all the ways

Rockwell-Nordstrom Valves Can Cut Costs for YOU


LUBE SCREW AND GUN FITTING
Maintains lubrication pressure.
OPERATING SHANK
Quick quarter turn opens or closes valve.
LUBE CHANNELS
Pressurized lubricant provides perfect seal.
TAPERED PLUG
Maximum strength, positive seating, perfect sealing.
LUBE CHAMBER
Jacks plug for easy operation, if necessary. No stuck valves.

In your plant there are probably scores of places—on degreasing equipment, or on air conditioning, fuel, hydraulic, and compressed air lines, for example—where Rockwell-Nordstrom valves can cut costs by doing their job better, longer, for less money per year.

The reason is simple. Forty years ago Rockwell-Nordstrom lubricated valves were created for tough oil field jobs ordinary valves couldn't handle. If they're a good investment for these rugged services, they're a doubly good investment for valve jobs in your plant.

Here's why:

—Sure shut-off. A film of pressurized lubricant around the plug provides a tighter seal than is possible with ordinary metal-to-metal contact.

—Easy, quick operation. Rockwell-Nordstrom valves *glide* open and shut on lubricant, which also hydraulically jacks the plug free from the seat. And because only one-quarter turn is needed, positive control response is assured. They're ideally suited for plant automation.

—Longer Life. Lubricant prevents grinding wear of metal-to-metal friction. Rockwell-Nordstrom valves last longer—cut maintenance, replacement and down time cost. And initial cost is no more than ordinary valves.

Send For Free Facts

A booklet showing Nordstrom principles and applications in industrial and process plants is yours for the asking. Send the coupon for Bulletin V-215.

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania Dept. S-G

☐ Please send me Bulletin V-215 ☐ Please send name of nearest Rockwell-Nordstrom industrial distributors

Name_____ Title_____

Company_____

Street_____ City_____ Zone____ State_____

Ultra Modern Headquarters — Metropolitan Edison Co., Reading, Pa.

Bringing Comfort to 600 Employees

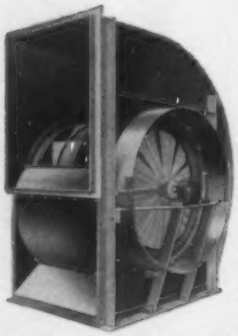
by use of Clarage equipment with the Heat Pump

Throughout this modern building, containing 190,000 square feet of floor space, air handling is by Clarage equipment.

Clarage products shown on the right and below are representative of those selected for Metropolitan Edison's new office and service headquarters.

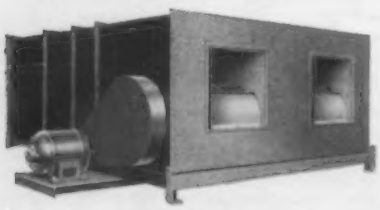
Here is equipment you can RELY on for trouble-free service and economical operation. Clarage designs and builds for "the long pull" — to stretch your equipment dollar to the utmost.

Recognizing this, the nation's leading engineers, architects, contractors, and building operators are demonstrating a growing preference for Clarage. Call us in for capable assistance on your next requirements. **CLARAGE FAN COMPANY, Kalamazoo, Michigan.**



Clarage Type NH fans for ventilating, air conditioning, and various industrial process services.

Clarage Unicoil Units — sprayed coil equipment for central station air conditioning systems.



Clarage Multitherm Units for comfort and process air conditioning.

You can Rely on **CLARAGE** ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES ● IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 587 on Reply Card

NEW PRODUCTS

(Begins on page 130)

Installation data indicates that the bond of Coro-Crete and concrete is stronger than the concrete itself, it is reported, and Tabor abrasion tests show it to be two to four times more resistant to abrasion than many concrete floors. Also, its physical strength is claimed to be about four times greater. The Ceilcote Co.

17—SUMP PUMP for installation above the pit

Installed high and dry above the pit, the Model 81¼ A-E is a self-priming centrifugal pump designed to handle flood problems easily. Only the suction line and strainer guard are in the sump—the pump cannot become mired, it is pointed out, and it keeps dewatering until the

job is finished. Manufacturer says that the floor cover may be tight, pipes and control wire hidden in floor and wall, and the pump itself remotely located.

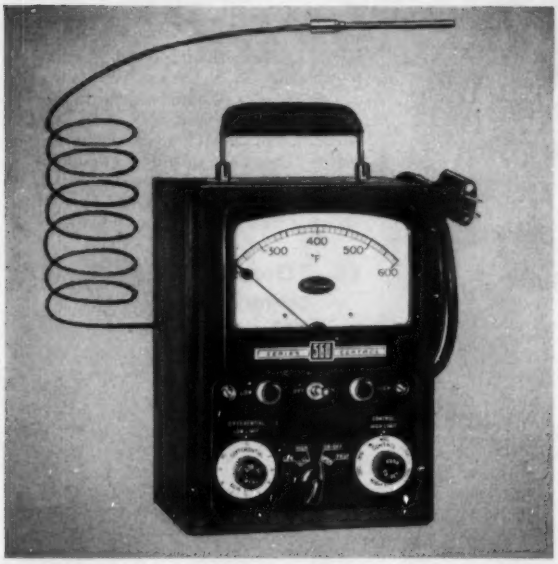
This pump has straight-in suction with no check valve. The elimination of entrance restrictions is designed to increase priming lift and efficiency and there are fewer working parts than in many sump pumps. Suction and discharge are 1¼ in. Typical performance is 3000 gal at a total head of 10 ft. The power unit is a standard face-mounted ⅓ hp, 115-v 60-cycle, 3450 rpm motor. Automatic controls start and stop the pump at predetermined water levels, and float switch or electrodes may be used. The pump is also available without motor. Form 4-IP-85 gives details. Gorman-Rupp Co.

18—WELDING POSITIONER for the smaller fabrications

The WP-1 Welding Positioner is designed for use as a bench model for faster production of smaller fabrications. With its 24-in. table in a horizontal position, it stands 15⅞ in. high. It weighs only 100 lb, and handles weldments up to 500 lb. A pedestal for floor mounting is available as optional equipment.

Rotation of the positioner's turntable can be done manually or with electric-motor drive. Motorized positioners have an electronically controlled, a-c motor drive which rotates the table at speeds from 0.18 to 4.47 rpm. Company says the push-button control furnished with the

Which of these two instruments provides the temperature control accuracy you need?



1. IT'S ELECTRONIC! The new Series 560 applies the thermistor principle in temperature indicator controls with heretofore unattainable accuracy over a scale range of 200° to 600°F. It's the *only* instrument that provides the three major control modes — (1) on-off (2) proportional (3) adjustable differential — all at the flip of a switch. Wide range of use for general laboratory, processing, molding or packaging applications.

2. IT'S MECHANICAL! The new Series 540 indicating controller combines low cost with high accuracy over a temperature range of 100° to 700°F. Temperature changes are transmitted by a bulb and bellows to an indicator control. Instrument features on-off control . . . adjustable differential . . . ambient compensation. May be flush or surface mounted. Capacity of 15 amps at 115 volts.

3. SIMPLICITY ITSELF is secret of Fenwal's Series 560 — accuracy, sensitivity and ruggedness. The thermistor's high resistance change permits operation with any length of lead wire up to 200 feet without affecting signal strength or accuracy. Thermistor is hermetically sealed in glass for stability; encased in stainless steel for ruggedness. No complex circuitry; maintenance is easy.

4. EASY "SET" AND "CHECK" OPERATION is a feature of Fenwal's Series 540 which is accurate to within 2% over the 100° to 700°F range, including the effects of ambient temperatures. Send for FREE NEW BULLETINS, MC122 on the Series 540, MC123 on the Series 560. Both contain full data you should have. Write to **Fenwal Incorporated, 357 Pleasant St., Ashland, Mass.**

Fenwal Controls Temperature... *Precisely*

For more facts circle 588 on Reply Card

dependable

. . . or else!

Boiler Feed Pumps, like these four Warren Pumps shown at the new, ultra-modern North Grafton, Massachusetts, Heavy Press Forging plant of

WYMAN GORDON COMPANY

must always be available for round-the-clock operation—if and when necessary.

Photograph, courtesy Wyman Gordon Company. Other Warren Pumps in this plant include Condensate and Fuel Oil Transfer.

These experience-rated Warren Pumps, and thousands of others in the power plants of important and vital industries, are built with substantial plus factors as to dependability, low maintenance and economy.

BOILER FEED, CONDENSATE, FUEL OIL BURNER AND OIL TRANSFER SERVICE . . . there are types and sizes of Warren Pumps that will meet your requirements and live up to their reputation for dependability, minimum maintenance, economical operation and long life.

WARREN QUIMBY PUMPS

P-33

WARREN PUMPS

WARREN STEAM PUMP COMPANY, INC.

Warren, Massachusetts

For more facts circle 589 on Reply Card

NEW PRODUCTS

(Begins on page 130)

electric model is a great advantage in welding. A tachometer can also be furnished to show rotating speed. According to company, the table can tilt a full 135 deg from the horizontal without the weldment striking the positioner. This feature is claimed to make difficult spots easier to reach. The manual tilting crank has a positive, spring-like indexing to maintain a pre-selected position. Welding Div., Harnischfeger Corp.

19—CONVEYOR BELT with centerbound weave

Designed for use where rigid sanitation conditions prevail, the Centerbound Solid Woven Conveyor Belt is suggested for low cost package conveying operations. Each ply of the Centerbound is a belt in itself, bound inseparably to the next ply. Should long periods of abrasion wear down a ply, manufacturer points out, other plies are unaffected and the belt is still useful. High grade yarn and centerbound construction give belting exceptionally high tensile strength, maximum flexibility and smooth surface, it is noted, and the belt withstands temperatures to 250F. Available in widths to 60 in. and in five weights corresponding to 2, 3, 4, 5 and 6 ply, belting can be supplied in rolls or endless with a strong flexible splice. Main Belting Co.

20—STAIN-FREE COOLANT for machining aluminum

Of particular interest to plants cutting and grinding aluminum, Compound 131-A is announced as a stain-free coolant with characteristics which eliminate problems commonly associated with this type of work. It has a high degree of lubricity and detergency and anti-weld properties that prevent welding of chips and dust to tools and wheels. It will not discolor aluminum alloys, it is noted, and produces a superior finish, both in appearance and profilometer readings. It does not react with aluminum dust, manufacturer states, nor create unsanitary conditions. International Chemical Co., Inc.

21—GAS-ELECTRIC TRUCK is 3000-lb capacity model

Like the larger models in this manufacturer's Gas-O-Matic line, the Model FD-30 utilizes a variable voltage generator integral with a gasoline engine. This, it is pointed out, gives the performance of a gas engine truck with the economy of an electric truck, eliminating the clutch and transmission. Gear shifting is also eliminated. The truck has a foot-pedal-operated electrical inching control which permits high speed hoisting at low travel speeds. Travel speed is regulated by an accelerator pedal, and maximum speed with full load is 8 mph.

The Model FD-30's power unit is a four-cylinder industrial engine. The hydraulic system is low-pressure with a

For more facts circle 590 on Reply Card →

AT LAST! Really Automatic Materials Handling...

IMPROVED PRODUCTION OF MACHINE OPERATORS
INITIAL INSTALLATIONS SHOW
SENSATIONAL SAVINGS
IN HANDLING TIME—

Work receiving box in same stand conserves floor area.

Big hopper holds work supply during box changing.

Here's materials handling history FLOW-MATION* by Powell—the greatest innovation in materials handling in a decade.
Your standard lift truck—no special attachments needed—sets a FLOW-MATIC* box on a special rack. The box opens under its own weight, discharging contents into work level hopper. Operator drops finished piece through chute into hopper to second box below. It's as simple as that.

Those who have seen it in action agree—there's nothing like it for cutting production time, reducing handling hours, lowering operator fatigue, conserving floor space—for saving you time and dollars. But get the entire story. See your Powell representative. He has full literature and working models. Or write direct to Powell for your copy of Powell FLOW-MATION* Systems, a specially prepared pamphlet that explains the entire system.

*FLOW-MATION and FLOW-MATIC are trade names of Powell Pressed Steel Co.—Product Patent Pending.

POWELL PRESSED STEEL Since 1930

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the POWELL PRESSED STEEL Co., Dept. 875, HUBBARD, OHIO

I would like a copy of FLOW-MATION*, the illustrated pamphlet that gives full details of the new Powell FLOW-MATION* System.

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Title_____ Company_____

Address_____

City_____ State_____

Specify NEW Tannate® heat-resistant packings*

Rhoads has recently developed a new heat-resistant leather for hydraulic and pneumatic applications.

During the last several months, these packings have been tested in the field under a variety of difficult operating conditions.

This new Tannate leather has consistently outperformed the best of the previous leathers under higher temperatures and we are now proud to include it in our line. When specified, they will be supplied at no extra cost.

Tannate heat-resistant packings are recommended for temperatures up to 190° F. continual use or for intermittent use up to 210° F.

Tannate packings will not readily cold flow or score the most highly finished surface. They provide an effective seal against hydraulic oils and many other gases and liquids.

Tannate has a low coefficient of friction . . . is custom impregnated for high or low pressure operation —precision molded and accurately finished to fit snugly against shafts and cylinder walls.

For further details write J. E. Rhoads & Sons, 2100 W. Eleventh St., Wilmington 99, Del.

*Available in U, Vee, Cup, Flange and disc for hydraulic and pneumatic equipment. When ordering please specify Tannate Heat-Resistant packings.

RHOADS
INDUSTRIAL LEATHERS

WILMINGTON • NEW YORK • CHICAGO • ATLANTA

For more facts circle 591 on Reply Card

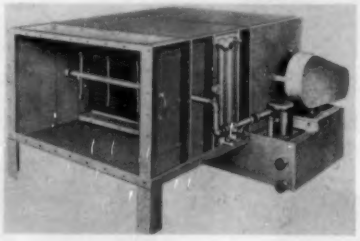
NEW PRODUCTS

(Begins on page 130)

continuous-flow pump supplying oil to lifting and tilting cylinders. Total lift height is 130 in. Overall length of the truck, excluding forks, is 78¾ in., width is 39 in., height 83 in. Baker-Raulang Co.

22—AIR CONDITIONERS, compact cabinet type

Main features announced for this new line of air conditioners include compactness, simple installation, design flexibility and a wide capacity range in all types from 600 to 48,000 cfm. There are three basic types: air conditioning units; sprayed coil conditioner units (shown);



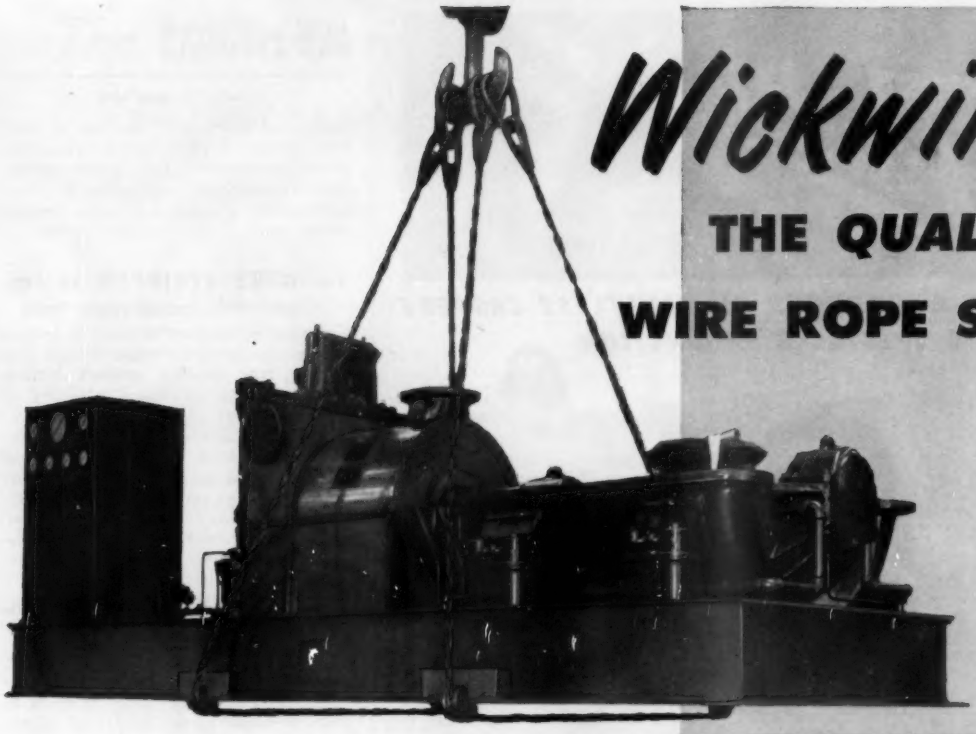
and multi-zone conditioner units. The air conditioning and sprayed coil conditioning units are available as horizontal or vertical arrangements, both with horizontal air flow through the cooling coils. Multi-zone conditioner units are made in one arrangement for either horizontal or vertical air flow.

Compactness and flexibility have been achieved through sectionalized construction and a basic fan unit design. Separate sections are provided for all accessories including heating, cooling, filtering and by-passing. A short drain pan is under the fan and coil sections only. All units have zinc-coated steel drain pans, wheels, housing and casing parts. The fans are driven at low speed by motors with rubber isolated mountings. American Blower Corp.

23—SECONDARY UNIT for liquid level indication

This electronic secondary remote liquid level indicator is introduced for use with company's primary remote liquid level indicator. The latter is actuated directly by manometric differential pressure and is designed to meet requirements of ASME Boiler Code Case 1155, even when used in combination with a secondary indicator. Addition of a small self-contained differential transformer to the primary instrument lets it operate the similarly equipped secondary instrument, which is actuated electronically and without pressure connections. It may be installed at distances to 5000 ft from the primary unit, it is noted.

The electronic secondary indicator is described as particularly useful for panel boards where fluids under pressure are undesirable—also for remote locations where intervening distance from primary



Wickwire!

THE QUALITY WIRE ROPE SLING

A sling is only as good as the wire rope from which it is made. Wickwire Wire Rope Slings are made from Wickwire Rope, the product of a company whose history goes back well over a century. This long experience in the design and manufacture of quality wire rope is applied to the fabrication of Wickwire Wire Rope Slings, making them worthy of the name "Wickwire." This means that Wickwire stands behind *every* sling it sells.

You benefit from our thorough knowledge and experience when you use Wickwire Wire Rope Slings. You are assured of materials of the highest quality. And in using wire rope slings, there can be no compromise with quality. Too much is at stake—the safety of the handling crew, possible damage to costly materials, and loss of productive time.

When you specify Wickwire Wire Rope Slings you get product responsibility that assures safe, efficient and economical service. Wickwire Slings are made from wire rope and fittings with matched rated capacities.

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Just write us on your company stationery and we'll rush your copy to you—*free of charge and postpaid.* Our 120-page manual gives complete up-to-the-minute data, with hundreds of explanatory illustrations. It has a tough permanent cover, is fully indexed and handy to use. You'll find it indispensable for quick reference and helpful information when specifying the Wickwire Sling you need for the best in sling service.

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CF&I WICKWIRE
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WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

For more facts circle 592 on Reply Card

Faultless CASTER MATERIALS HANDLING FACTS

ICE FOLLIES WARDROBES ON FAULTLESS CASTERS SPEED UP BIG SPECTACLE PRODUCTION

No. 1121-4 TRUCK CASTER WITH DOUBLE BALL BEARING SWIVEL

Note two, large diameter raceways completely filled with hardened and polished balls for easier swiveling. All raceways are full hardened and accurately formed. Choice of wheels to suit load requirements, and floor surface.

The colorful, spectacular "Ice Follies" is truly a production operation that would be the envy of any industrial executive. The facilities and planning that go into this show are equal to the most advanced industrial manufacturing operations. A 16-car train is needed to carry the personnel, costumes, office, and staging equipment to 23 U.S. and Canadian cities, covering a distance over 20,000 miles each season. It takes 197 specially built castered cases to pack and ship the costumes and staging effects. Some filled cases weigh as much as 3280 pounds and others are small enough for one man to lift easily. Each case is mounted on Faultless 1121-4 Double Ball Bearing Swivel Plate Casters.

The ICE FOLLIES is typical of the efficiently organized companies who rely on Faultless Engineered Casters for materials handling problems.

Their choice of the Series 1100 Caster was based on its over-size King Bolt that holds the top plate and ball bearing retainers firmly together for maximum strength and mobility. Your nearby Faultless Distributor has the experience to recommend the right casters for your particular need right from his stock. Look for him in your phone directory, or write, no obligation.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, INDIANA

For more facts circle 593 on Reply Card

NEW PRODUCTS

(Begins on page 130)

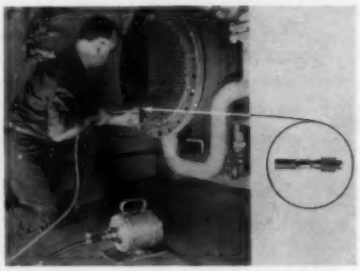
instrument is too great for use of pressure tubing, or subject to freezing conditions unsuitable for liquid tubing. Another suggested application is where a secondary instrument is to be elevated above liquid level. Yarnall-Waring Co.

24—WIRE STRIPPER is improved, hand-type tool

The new Stripmaster is said to feature 60 per cent more strength through new I-beam type handles, greater holding power in jaws. It strips a variety of sizes and types of wire. Faster, easier stripping is claimed through the single-squeeze operation. A light squeeze of the handles strips wire clean and bare up to full 7/8 in., says manufacturer. Release the handles, remove the stripped wire and the jaws snap back into position for next cut. Ideal Industries, Inc.

25—TUBE CLEANER for air conditioning systems

The AB Tube Cleaner is an electrically driven unit especially developed for air conditioning condenser tubes 5/8 to 7/8 in. OD. Designed for simplicity of operation in the rapid removal of algae, slime



and mud deposits, its use is said to result in the reduction of condenser head pressure. Equipped with a carrying case and built-in base, the cleaner is lightweight and portable. It is powered by a 1/4 hp 3450 rpm motor available in 110-220-v a-c, single phase only. Several types and lengths of flexible shafts and metallic casings are available for various tube sizes. Thomas C. Wilson, Inc.

26—HAND TRUCKS for high standing, tilting fork

The Hi-Lo Stacker, a line of battery-powered, tilting fork hand trucks in 1500-, 2000-, 2500- and 3000-lb capacities, 24-in. load center, has been added to this company's Powrworker series of hand trucks. Equipped with telescopic channel uprights, the truck has a free lift of 64 in. with an 83-in. overall height and maximum fork height of 130 in. For highway truck loading, an overall height of 68 in. is also standard and provides a free lift of 49 in. with maximum fork lift of 100 in. The stackers can also be equipped with single lift (non-telescopic) channels which have an overall height of 83 in.

The USS Forrestal—

another example of how Walworth helps protect a 200 million dollar investment

Walworth products installed aboard the *USS Forrestal* include gate, globe, and lubricated plug valves and pipe fittings. They are used on high pressure air lines, fire mains, and most of the other piping systems throughout the ship.

Thousands of Walseal® Bronze Valves, Fittings, Flanges, and Unions comprise the major portion of the Walworth installations.

Walseal is a registered trade mark which identifies valves and fittings manufactured by the Walworth Company. Walseal products have *factory-inserted rings* of silver brazing alloy in threadless ports. Walseal joints can be made only with Walseal valves and fittings.

WALWORTH

valves . . . pipe fittings . . . pipe wrenches

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Walworth Company of Canada, Ltd., Toronto

Keel laying to launching—Walworth was there.

Walworth engineers worked with designers, metallurgists and builders of the mighty flat-top right from the blueprint stage. Their efforts assured the builder – Newport News Shipbuilding and Dry Dock Company – that *every* Walworth Valve and Fitting installed would meet *every* specification right down to the finest detail.

The *Forrestal* – like the *USS Nautilus*, the first nuclear-powered submarine – is another striking example of where Walworth engineering and products were called upon to protect a multimillion dollar investment.

Walworth, backed by 113 years of practical valve experience, is skilled in every type of installation. Whatever the industry, if your problem concerns valves or fittings, it will pay you to call on Walworth! Distributors in principal cities throughout the world.

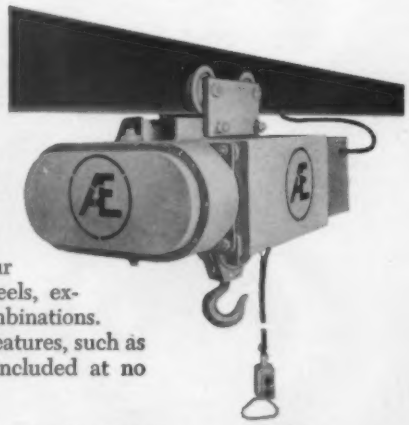
Materials handling is easier, cheaper, with
LO-HED HOISTS

WHICH TYPE OF LO-HED IS BEST FOR YOU?

HERE'S THE FAMOUS CUSTOMIZED LO-HED

Available in a range of capacities from ¼ ton to 12 tons... and five suspension types... Customized Lo-Hed is feature-packed for operational speed, safety and economy. Its design provides low headroom. It's built for longer service life. The bottom block is shrouded. The hook, on an oil-impregnated bearing, prevents fouled lines. On a-c installations a transformer puts only 110 volts at the push-button. And all these extra advantages are yours at no extra cost... Talk over with your local Lo-Hed representative the adaptability of Customized Lo-Hed for your special requirements.

AND HERE'S THE PACE-SETTING STANDARD LO-HED



Standard Lo-Hed, as you've heard, is the sensation of the heavy duty hoist field. Available in 2 and 3 ton capacities, it's truly a standard hoist; quantity-produced and ready for shipment from stock. The last word in modern engineering and materials, its welded steel chassis combines light weight and rigidity. Its straight line spur gear drive eliminates worm-wheels, extended shafts and split gear combinations. Its price is right, too, and extra features, such as lower limit safety switch, are included at no extra cost.

Write for literature describing either the Customized Lo-Hed or the Standard Lo-Hed, or both. Lo-Hed Hoists are cutting material handling costs in plants from coast to coast. American Engineering Company, 2503 Aramingo Ave., Philadelphia 25, Pa.

LO HED

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For more facts circle 595 on Reply Card

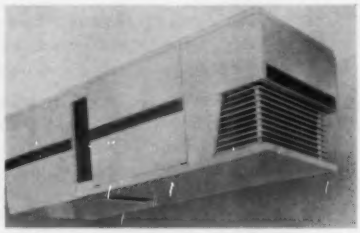
NEW PRODUCTS

(Begins on page 130)

and provide maximum lift of 66½ in. A heavy-duty electric motor with gear pump provides power for both hoisting and tilting through an oil hydraulic system. Clark Equipment Co.

27—AIR CONDITIONERS need no floor space

Packaged air conditioners requiring no floor space will be in limited production this year. The new horizontal line, designed to be suspended from the ceiling or shelf-mounted, includes both water-



cooled and air-cooled (waterless) models —the latter announced as the first completely packaged air-cooled units. The new air conditioners come in 3-, 5-, and 7½-ton models.

The same hermetically sealed condensing unit used in company's floor models is used in the new water-cooled units. On these, air enters at the rear; on the air-cooled models return air enters through grilles at the bottom and sides of the unit. An automatic electrically-activated "muggy weather control" has been provided to give even higher moisture removal on humid days. Accessories include a heating coil which can be used with steam or hot water and three-way directional air distributor for free air delivery within the conditioned space. Prices on water-cooled models are the same as company's present floor models; air cooled models cost slightly more. General Electric Co.

28—MAGNETIC TRAPS to catch iron in pipelines

For removing iron fines and tramp iron from practically any kind of liquid material, Ferrotraps are claimed to afford 300 to 400 per cent greater magnetic trapping area than many magnetic units. Compact, self-contained, and versatile in ease and flexibility of installation, these traps incorporate Alnico V magnets, and they are designed for ease of cleaning.

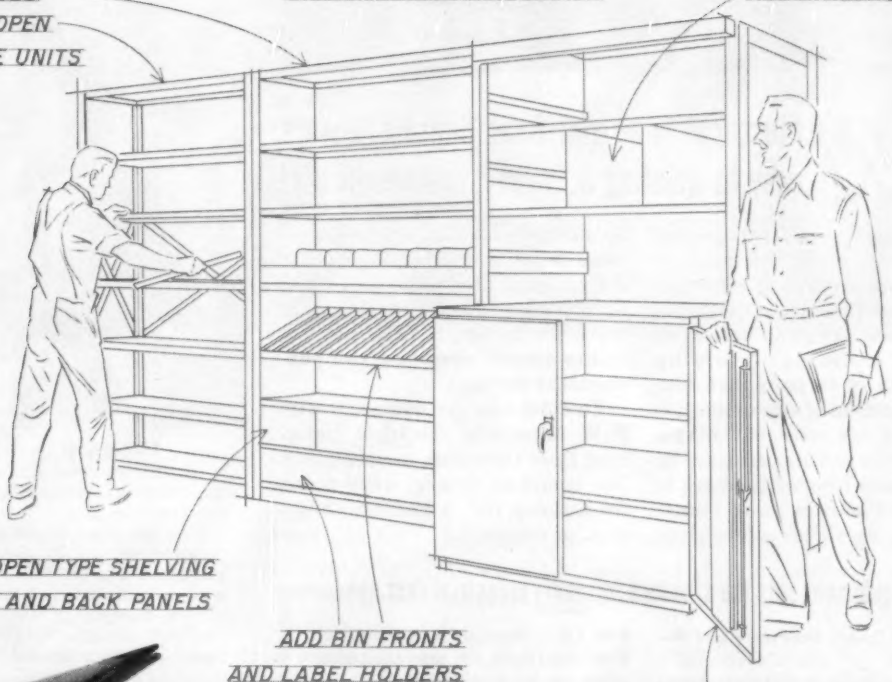
Ferrotrap Model B, for greatest protection, is of 316 stainless steel in polished (inside and out) sanitary models as well as machine finished units, and is available for 2-, 3- and 4-in. pipelines. Multiple magnetic units in stainless steel tubes are so positioned that even fine iron is captured and retained. It is explained that, in operation, iron accumulation tends to work around to the down-

HOW TO USE HALLOWELL ADJUSTABLE SHELVING IN PLANT MODERNIZATION

CHOOSE CLOSED OR OPEN TYPE UNITS

SET THEM UP INDIVIDUALLY— OR COMBINED AS REQUIRED

ADD DIVIDERS



CONVERT OPEN TYPE SHELVING WITH SIDE AND BACK PANELS

ADD BIN FRONTS AND LABEL HOLDERS AS NEEDED

ADD SWINGING OR SLIDING DOORS TO CLOSED TYPE UNITS

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HALLOWELL SHOP EQUIPMENT DIVISION

SPS

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BENCHES (CABINET, WORK, UNIT) • STOOLS AND CHAIRS • SHOP DESKS • TOOL STANDS AND CABINETS • DRAWERS, DRAWER TIERS • STEEL CARTS • SHELVING

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Look! No Hands!

R-W Electrical Industrial Door Operators work easy as pointing a finger... automatically!

You don't pay a penny *extra* for the trouble-free dependability designed and built into every R-W electrical door operator. Like magic, Richards-Wilcox operators open and close swinging... sliding... folding doors, singly or in pairs, *automatically*—regardless of size or weight.

But there are *other* advantages too: valuable savings in time as products move from department to department within your plant; greater efficiency and safety since no manual operation is necessary—cable switches, push buttons or radio, magnets or electric eyes see to that! Because doors are tightly shut when not in use, heating and humidity-control costs are also substantially reduced.

Find out how *you* can profit with R-W Automatic Electrical Industrial Door Operators in your plant. For complete details, write today for Catalog No. A-87. No obligation, of course.

R-W equipment sets the standard for every industrial door need

R-W Fire Doors, Hardware and Accessories . . . are Underwriter's and Factory Mutual Laboratories Approved for all Class A-B-C-D-E and F openings, in a wide variety of constructions including flat surface, all-steel and corrugated sheet metal. Sliding, hinged or vertical doors with flat or round track, single or double-link hardware.

R-W Track, Hangers and Industrial Door Hardware are manufactured with precision and care—to give you the ultimate in quality and service. Ask about R-W "Lock-Joint" tracks and hangers for sliding doors . . . R-W hardware for swinging, folding or overhead doors . . . for all types of industrial doors weighing up to 3000 pounds each.

75 YEARS of QUALITY and SERVICE by RICHARDS WILCOX AURORA, ILLINOIS

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For more facts circle 597 on Reply Card

NEW PRODUCTS

(Begins on page 130)

stream side of the tubes where it offers no interference to flow. The magnetic tubes are mounted as an integral part of the cover. The trap may be mounted with cover plate up, down, or on either side, or as part of a vertical pipeline.

Ferrotrap Model L is for use where a low-cost unit primarily required for tramp iron separation, will provide adequate protection. Adaptable to pipelines from ½ to 2 in., Model L is made of bronze and contains one fully encased magnetic element. This trap can be installed horizontally, vertically or at a right angle turn in a pipe. Eriez Mfg. Co.

29—MAST ASSEMBLY gives truck panoramic visibility

The Monomast consists of two box type sections, one telescoping within the other. Total weight of this upright is about the same as standard type assemblies, says company, but its tubular design is stronger than comparable models; also

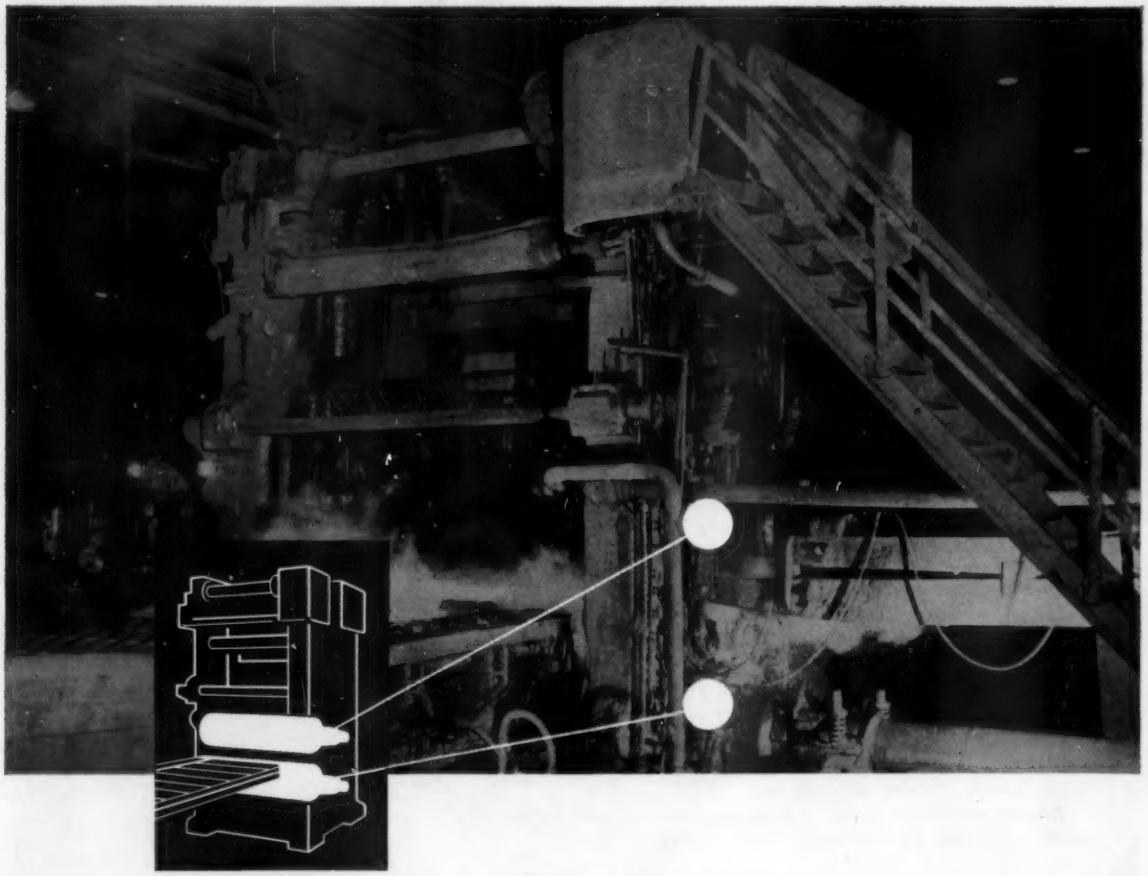
torsional rigidity is increased and mast deflection reduced. The new design allows a 15 per cent increase in speed, it is pointed out—load raising speed is 58 fpm, with a corresponding increase in lowering speed.

This new mast is designed for company's Model UC-30 and Model YC-40 gasoline trucks of 3000- and 4000-lb capacities. Standard hydraulic attachments can be mounted on the Monomast attachment carriage—non-hydraulic attachments are also available. The Monomast mounting is conventional and can be field installed on current Models UC-30 and YC-40. The Hyster Co.

30—INDUSTRIAL FANS reduce room temperature

Improved working comfort through greater air circulation and reduced room temperature is promised users of these large portable and stationary industrial fans. The line of Mancooler Fans range in sizes from 24- through 48-in. diameter units in portable and stationary models and 18 through 48 in. diameter units for ceiling or wall mounting. Capacities range from 1,910 to 34,400 cfm; 1/20 to 5 hp. All models are made of one-piece cast aluminum blades. Safety

Lubricating roll necks is no easy job



Lubricating the roll necks of a steel mill calls for a lubricant that will resist high temperatures. The lubricant must also function in the presence of steam, water, mill scale and other abrasive materials. It has to cushion great shock loads and cling tenaciously to the bearings it protects. It must last a long time... and it must be economical in use.

Atlantic Lubricant 10 performs exceptionally well in this service. It is being used in a pressure system on the mill illustrated, at the Lukens Steel Company in Coatesville, Pa., for the lubrication of roll neck bearings, pinion and spindle bearings.

Selecting the correct lubricant for the job is simplified when you call in your Atlantic Lubrication Engineer. He is a man with years of on-the-job knowledge of heavy industrial lubrication requirements of all kinds.

Why not see for yourself the value of Atlantic service? Just write, wire or phone the office nearest you for full information. The Atlantic Refining Company, Dept. M-7, 260 South Broad Street, Philadelphia 1, Pa.

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ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

For more facts circle 598 on Reply Card

The INDUSTRIAL WORKER knows

—and he knows at close range—that an accident means serious personal tragedy to the worker as well as financial and production problems to the plant.

It's a fortunate worker who is employed by one of the progressive firms which have taken the practical step that *assures* safety against slipping accidents . . . by installing ALGRIP . . . the world's only Abrasive Rolled Steel Floor Plate. Oily, wet or greasy—level or on slope—the ALGRIP floor is foot-safe for the worker . . . safe against skidding for material-handling equipment . . . because ALGRIP's uniformly and deeply embedded abrasive keeps it safe . . . year in, year out.

ALGRIP maintains itself . . . cuts accidents . . . and insurance costs . . . to help pay for itself.

A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP — *Approved for Safety by Underwriters' Laboratories.*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

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Other products: A.W. SUPER-DIAMOND Rolled Steel Floor Plate—Plates —Sheets—Strip—(Alloy and Special Grades)

For more facts circle 599 on Reply Card

NEW PRODUCTS

(Begins on page 130)

guards are removable for access to motor and blade. Units are adjustable to control direction of air flow. Welded steel tubular construction forms rigid support for floor models. Wall or ceiling mounts are formed angular steel construction. Fan motors are available in a selection of horsepower ratings. M & E Mfg. Co.

31—INDUSTRIAL GLOVE offers comfort, finger dexterity

Made of flock-lined Neoprene, the Stanzoil NS-35 Industrial Glove features a lining of thousands of tiny cotton particles bonded to the inside of a Neoprene outer glove. Besides giving wearer maximum comfort without decreasing finger dexterity, the NS-35 is said to have an effective molded non-slip grip on fingers and palm. Suitable for chemical mixing operations, assembly, inspection, parts handling, photography, polishing, painting, leather and textile processing, and laundry work. Pioneer Rubber Co.

32—TRAFFIC CONTROLLER for conveyor lines

Rapistan Traffic Controller is designed to regulate flow of goods from two merging conveyors and eliminate jamming at the point of intersection. It will handle a wide range of container types and sizes,

it is announced, and can be used with either belt or live-roller type conveyors. The controller is ordinarily mounted between two converging conveyors with a steel arm extending across each unit. An article moving on one conveyor sweeps back the arm on that side, setting a mechanical interlock that prevents movement of goods on the other line. When the first line is clear the arm swings back, allowing goods on second line to flow to junction point. The Rapids-Standard Co., Inc.

33—MAGNETIC STARTER for air conditioning

This magnetic starter for air conditioning and refrigeration is specifically designed for control of hermetic motors. Available in two ratings—20-amp continuous with 120-amp locked-rotor current, and 30-amp with 180-amp locked-rotor current—the starters can be furnished either open or in NEMA 1 enclosures, and can be applied up to 230 v. Fast tripping time of the relays matches

A Company is known by the Washrooms it keeps

When a visitor sees a company washroom that is clean and modern—he feels instinctively that "this must be a good place to work."

Employees feel it even more strongly. For to them day after day, such washrooms indicate a thoughtful and appreciative management.

But there is more to an efficient washroom than modern facilities. The kind of supplies you provide there are important too. For instance, people dislike rough, flimsy, or inferior paper towels, and justifiably so.

Scott is the brand most people buy for their own homes. And a ScotTissue Towel is a towel they like on the job. It's soft, absorbent—quick to dry completely—and economical too.

Let your local Scott representative or distributor give you the details. Scott also has a "Planned Poster Program" which helps to promote washroom cleanliness and cut towel consumption. This is yours without obligation—simply by writing the Scott Washroom Advisory Service,® Scott Paper Company, Dept. PE-7, Chester, Pa.

It's good business to use

SCOTTISSUE® TOWELS

For more facts circle 600 on Reply Card

Pangborn answers the

"Call from Philip Morris"

Collects 5,000 lbs. of tobacco particles daily to be sold for salvage.

At the stemmery plant of Philip Morris and Co., Ltd., Richmond, Va., the tobacco used in Philip Morris products is processed prior to manufacture into cigarettes. To keep the working area immaculate and maintain the excellent operating conditions, Philip Morris calls upon four Pangborn Dust Collectors for efficient removal of any minute tobacco particles released in this processing. Every day, Pangborn Dust Control collects 5,000 lbs. of particles which are sold as fertilizer ingredient. In addition, Pangborn minimizes plant housekeeping problems.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money.

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

For more facts circle 601 on Reply Card

NEW PRODUCTS

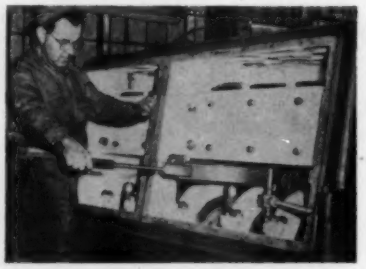
(Begins on page 130)

hermetic motor operating characteristics, it is noted, thereby prevently costly motor burnouts. Relays are factory calibrated to reduce variations in tripping times and factory sealed to eliminate malfunctioning due to tampering. They are available with hand or remote automatic reset. Westinghouse Electric Corp.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 165-166. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

34—GEARED-HEAD WRENCH generates high torque

This "4-to-1" geared-head wrench is announced for heavy assembly and disassembly work requiring rotary effort over 200 ft-lb. An intermediate unit, the X-4 is designed for use with ratchets,



torque wrenches, sockets, and attachments. Torque is produced through planetary gears. A rugged unit, the X-4 is lightweight and portable—declared ideal for work in close quarters. Known 4-to-1 ratio permits its use as a multiplier for torque wrenches, says company, and in tightening or loosening threaded parts there is no snap or jarring action. Easily used, this wrench has a drop-forged, heat-treated chrome-moly steel head. Stressed parts are heat-treated alloy steels, it is noted. Bonney Forge & Tool Works.

35—GRAPHITE DISPERSION with anti-seize properties

Graphite 'dag' Dispersion 217 is announced as having unusual anti-seize properties. A ready-to-use paste of semi-colloidal graphite in a special carrier, it was developed specifically as an anti-seize and sealant for high-pressure oxygen systems where line pressures reach 2000 psi. The dispersion possesses positive anti-seize properties at oxygen pressures as high as 2000 psi, it is said, and at temperatures ranging from 160 to —65 F. It is described as non-flammable, and is available in quantities from 4-oz tubes to 390-lb drums. Acheson Colloids Co.

REPORT FROM DANLY

15 years heavy handling "AROUND THE CLOCK" from 9 Whiting Cranes!

In 1940, Danly Machine Specialties, Inc., a leading manufacturer of mechanical presses, installed nine Whiting Overhead Electric Traveling Cranes in their Chicago plant. These cranes have been in operation practically 24 hours a day, six days a week, for fifteen years. All production moves via these cranes, and Danly depends on them to meet schedules without fail. This phenomenal record is the result of (1) Danly's program of specialized crane maintenance, (2) the foresight of Danly executives and Whiting engineers — working together and planning the installations to meet *future* as well as present needs, (3) the outstanding features built into Whiting Cranes that assure peak performance at low cost. These features, to mention a few, include anti-friction bearings, precision-made gears, securely-fitted shafts and flanged couplings. Send for our new booklets — Unit 79 "How to Select A Crane" and Unit 80 "Presenting Whiting Cranes."

WHITING CORPORATION
15675 Lathrop Avenue, Harvey, Illinois

Cranes • Trambeam • Trackmobile • Chemical Processing, Foundry and Railroad Equipment

For more facts circle 602 on Reply Card

EXTEND GEAR LIFE

with UCON synthetic lubricants
Trade-Mark

Here's an actual case:

Identical bronze ring gears, driven by alloy-steel worms, in speed reducers that couple 75-hp. motors to rotary pumps . . .

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WHY these outstanding results?

Because UCON Lubricants have

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Find out how UCON Lubricants can help you solve your tough lubrication problems. Return the coupon *today*.

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For more facts circle 603 on Reply Card

NEW BOOKS

for the plant engineer

On Solar Energy

APPLIED SOLAR ENERGY RESEARCH, edited by E. J. Burda. Size 8½ by 5½ in.; 298 pp. Published by Stanford Research Institute for the Association for Applied Solar Energy, Suite 204, Mayer-Heard Building, Phoenix, Arizona. Price $5.00 (cloth bound) or $4.00 (paper bound).

PRINCIPALLY, this book contains an extensive bibliography of literature on solar energy use. It also has a directory giving locations and names pertaining to research activities in applied solar energy work. The publication includes concise reports covering specific operations in various countries throughout the world.

Directory of Consultants

CONSULTING SERVICES. Size 9 by 6 in.; 144 pp; paper bound. Published by Association of Consulting Chemists and Chemical Engineers, Inc., 50 East 51st Street, New York 17, N. Y. Price $1.00.

WHEN YOU ARE looking for a consultant in the specialized field of your problem, here is a book that can be of some assistance. This publication is of interest not only to those in the chemical industry but those with chemical processes in their plants.

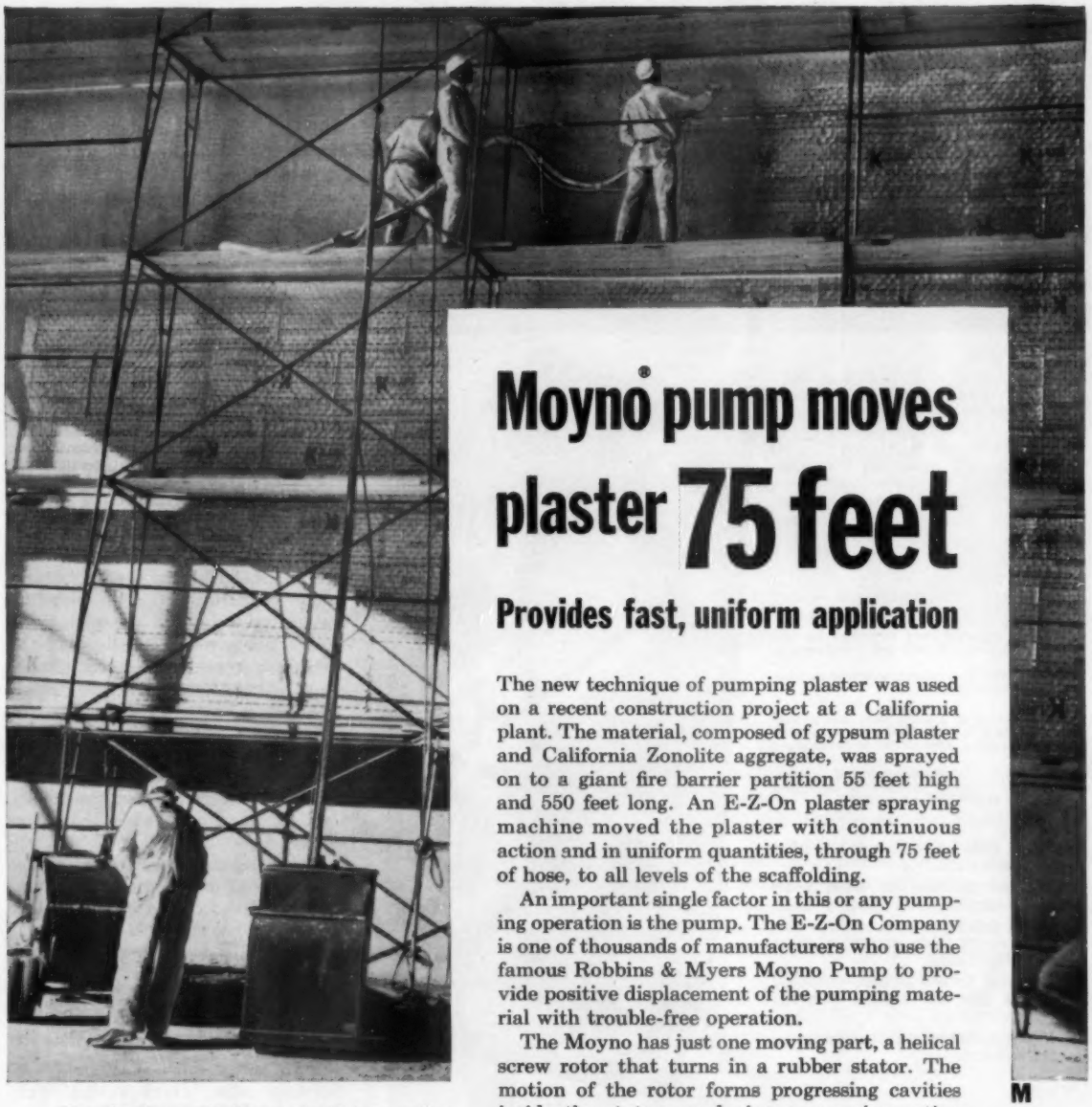
The book includes a classifier which identifies consultants by their specialties. The classifier covers such subjects as abrasives, air conditioning, ceramics, pH control, and x-rayed fraction analysis. The "scope pages" describe each member's qualifications and activities. Members and their geographical locations and organizations to which they belong are indexed in the back of the book.

For Better Cost Control

FRONT LINE COST ADMINISTRATION by Wilmer C. Cooling. Size 8¼ by 5⅝ in.; 259 pp including index; illustrated; cloth bound. Published by Conover-Mast Publications, Inc., Book Div., 205 E. 42nd St., New York 17, N. Y. Price $5.00.

APPROPRIATELY TITLED, this book is a helpful tool primarily for foremen and supervisors, men dealing with actual operations. They are the ones who daily come in contact with men and machines and are in position to control activities at close range.

This book offers practical industrial engineering information not only to the people mentioned but to others interested in bettering the operations in



Moyno® pump moves plaster 75 feet

Provides fast, uniform application

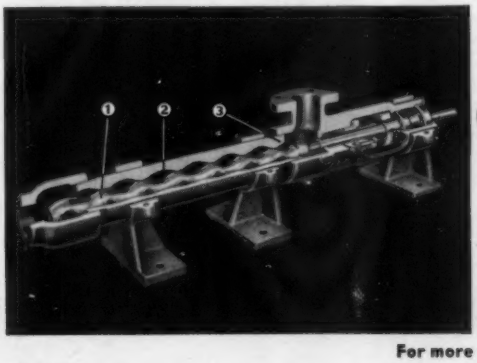
The new technique of pumping plaster was used on a recent construction project at a California plant. The material, composed of gypsum plaster and California Zonolite aggregate, was sprayed on to a giant fire barrier partition 55 feet high and 550 feet long. An E-Z-On plaster spraying machine moved the plaster with continuous action and in uniform quantities, through 75 feet of hose, to all levels of the scaffolding.

An important single factor in this or any pumping operation is the pump. The E-Z-On Company is one of thousands of manufacturers who use the famous Robbins & Myers Moyno Pump to provide positive displacement of the pumping material with trouble-free operation.

The Moyno has just one moving part, a helical screw rotor that turns in a rubber stator. The motion of the rotor forms progressing cavities inside the stator, producing a pumping action with continuous flow and positive pressure. The Moyno Pump is versatile; handles liquids, slurries, pastes, and semi-solids.

If you have a pumping problem, find out if the Moyno can help you. Write for a free copy of Bulletin 30-C-PE containing details on Moyno Pumps or ask for a pump specialist to call. Robbins & Myers, Inc., Pump Division, Springfield 99, Ohio.

How the Moyno Works: as rotor **(1)** turns, cavities **(2)** progress toward discharge end of stator **(3),** carrying pumped material. Rotor-stator contact forms progressive seal lines, insuring positive displacement. Pump is available in wide range of construction materials to handle any application.



MOYNO PUMPS

R&M®

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO • BRANTFORD, ONTARIO

Fractional and Integral HP Motors

Desk, Window, and Household Fans

Hoists and Cranes

Moyno Pumps

Propellair Industrial Ventilating Equipment

For more facts circle 604 on Reply Card

more power **now!**
get at least **10%** more power

with C&D's new **66** and **125** Industrial truck batteries

The proven retention qualities of C&D's famous Five-Fold Slyver-Clad* construction virtually eliminates shedding and needed sediment space is held to a minimum. In the new 66 (HA) and 125 (HB) batteries, C&D utilizes the extra space thus obtained in a standard jar by using the longest, thickest plates in the industry to give: *T.M. Reg.

Extra life! Maximum capacity!

Plus—

Post corrosion and leakage eliminated by lead bushing in cover.

Easier maintenance provided by new level indicator to prevent overflushing.

Separator breakage prevented by plastic moss shield.

Extra strong plates cast by special process which eliminates flaws, shrinkage, cracks, and dross inclusions.

New jar and cover—molded of special hi-impact compound designed to resist breaks and leaks.

This is Slyver-Clad construction.

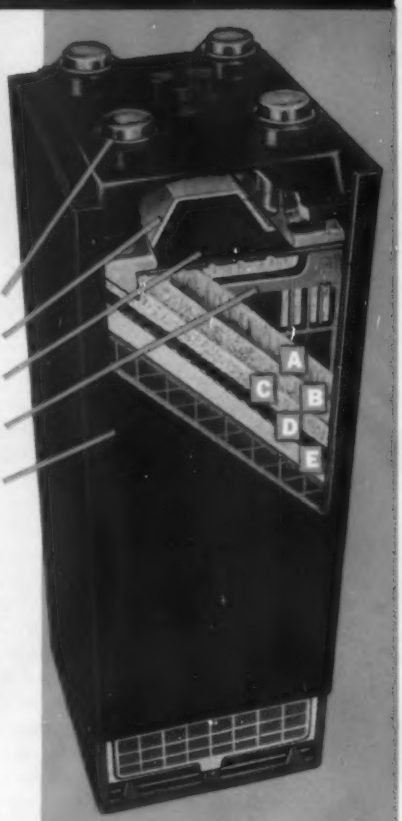
A Slyver; parallel glass fibres to hold active material in place.

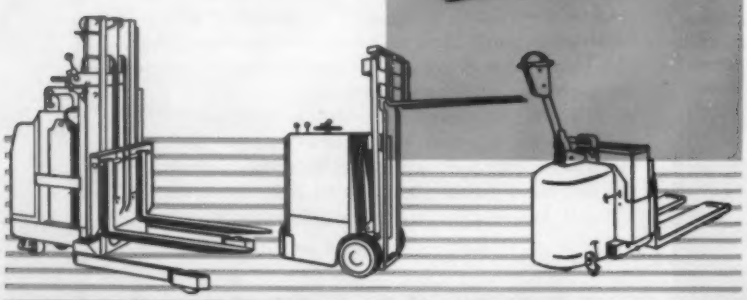
B First glass expansion mat—allows normal plate expansion; holds Slyver in place.

C Second glass expansion mat—allows additional normal plate expansion; covers vertical plate edges.

D Perforated Koroseal retainer—completely encases plate, and insulates sides and bottom.

E Microporous rubber or plastic separators—last a lifetime.





C & D BATTERIES

work stronger—longer!

For more facts circle 605 on Reply Card

a plant. It covers such subjects as methods, costs, standards, training and job evaluation.

Among the items covered in the chapters are the following: administration of wage incentive system; maintenance of equipment; operating reports; design and materials; individual, machine and group standards.

In the appendices there is a sample job description for a foreman, a performance review form for rating a foreman, and an outline for a seminar on cost control.

Stainless Steel Forming

FORMING OF AUSTENITIC CHROMIUM-NICKEL Stainless Steels. Size 11¼ by 8⅞ in.; 394 pp including index; illustrated; 1954 edition; cloth bound. Published by the International Nickel Company, Inc., 67 Wall St., New York 5, N. Y. Price $5.00.

THIS IS a nicely illustrated and informative edition of the book which was first published in 1947. It covers newly developed processes including the method in which one solid die is used. Attention is also given to the effects of temper, finishes and composition on the forming characteristics. Along with a bibliography useful for further study, the book contains 30 tables and 293 detailed drawings.

Among the subjects appearing in the 14 chapters of the book are the following: design, layout and preparation of blanks; bending and straight flanging; forming of curved sections and tubing; deep drawing of cup-shaped, box-shaped and related parts; forming by high pressure flexible die methods; expanding and reducing tubular parts.

Scientific Conversation

ELECTRONS, ATOMS, METALS AND ALLOYS by William Hume-Rothery. Size 8⅝ by 5¾ in.; illustrated; 387 pp including index; cloth bound. Published by Philosophical Library, Inc., 15 E. 40th Street, New York 16, N.Y. Price $10.00.

AN UNUSUAL MANNER of presenting technical information to the reader is employed in this book. Subject matter is handled in the form of a conversation between an older metallurgist and a young scientist.

The dialogue begins with a discussion on the nature of an atom and includes several theories on the hydrogen atom. Attention is given to the electronic structure of elements. The conversation continues into the nature of a metal covering such items as free electron theory, crystal structures, insulators and semi-conductors, and plastic deformation.

Among the topics discussed in the section on the nature of an alloy are

the following: primary solid solutions, intermediate phases in alloy systems, superlattice structures, and interstitial compounds in alloys.

The old metallurgist and young scientist terminate their informative conversation in a section on the structure of the nucleus. This phase of the discussion goes into items like radioactivity, atom disintegration, and fission of the nucleus.

Machine Parts in Motion

DYNAMICS OF MACHINERY by A. R. Holowenko. Size 9¼ by 6¼ in.; 464 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $7.50.

DEMANDS PLACED on equipment to operate at greater speeds makes a good background of machine dynamics desirable for designers. In this book is offered considerable information on a subject which is based on Newton's laws.

The author makes use of free body illustrations and presents graphical as well as analytical development methods. For an overall study of the book's contents a working knowledge of both differential and analytical calculus is considered desirable.

Among the 22 chapters in the book are the following: velocities and accelerations; special methods of acceleration solutions; review of static forces and graphic statics; dynamic analysis; balancing machines; balancing masses in several planes; and vibrations in shafts.

On Materials

MATERIALS OF CONSTRUCTION rewritten and edited by L. F. Rader. Size 9¼ by 6¼ in.; illustrated; sixth edition; 650 pp; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $7.50.

THE ORIGINAL EDITION of this book covering the manufacturing of construction materials and their properties was written by the late Prof. A. P. Mills of Cornell Univ. The late Prof. H. W. Hayward of M.I.T. edited the second to fourth editions, inclusive.

Several new chapters have been included in the present edition and the book has been revised to contain new information. The book covers the subject extensively in a relatively simple manner.

Material appears in ten principal sections dealing with: definitions, metals, building stones and mineral aggregates, cementing materials, concrete, bricks and clay products, timber, plastics, laminates and adhesives, and organic coatings.

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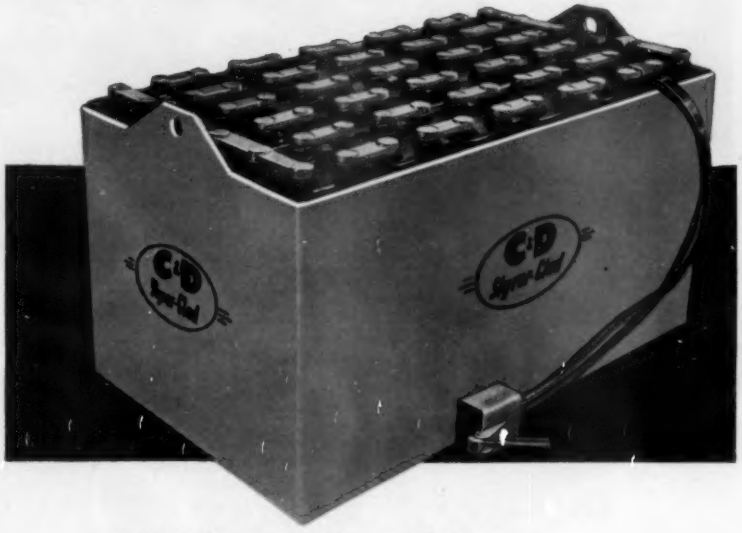

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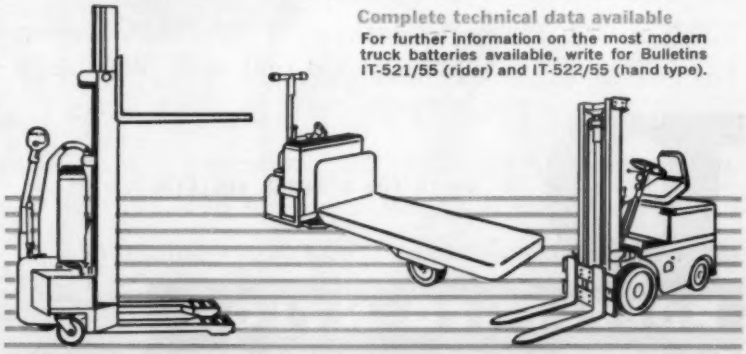
Industrial truck batteries

Ten years ago C&D pioneered two high capacity batteries—and the users of these batteries today represent a bluebook of American industry.

Now, after continuing research, development and testing, the newest additions to C & D's line of industrial truck batteries, the 66 and 125 are available. Now you can get at least 10% more capacity in standard size trays for your truck. *In truck operation, this means at least a 10% longer duty cycle.* Now, you can put the most modern maximum capacity industrial truck battery on the market today—C & D's Five-Fold Slyver-Clad* to work in your trucks. Remember—C & D Slyver-Clad Batteries move more tons—for longer periods! *T.M. Reg.

Complete technical data available
For further information on the most modern truck batteries available, write for Bulletins IT-521/55 (rider) and IT-522/55 (hand type).



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*trademark for Du Pont tetrafluoroethylene resin

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Planned Lubrication

(Continued from page 90)

operator, without stopping production.

Another gimmick: wherever possible the oiler works from the back of the machine, again, allowing production to continue uninterrupted. Inception of the program caused Minneapolis-Honeywell to junk many too small oil containers which used valuable production time, needed too frequent filling. The aim: one cart capable of holding every grease and oil needed for all but highly specialized machines. And capacity enough to last out at least an eight-hour lube shift.

That in concept and practice is M-H's "Planned Route" system. If nothing more, it has saved hundreds

of production hours daily—by putting all maintenance lubrication into plant engineering's hands. More important, it has established a time-table for lubrication—geared to production, to Minneapolis-Honeywell's own workaday routine, and specifically to production machines.

Safe Fuel Testing

(Continued from page 91)

windows and doors, equipped with safety latches, are designed to swing out in the event inside pressure is exerted on this area. This action relieves pressure in the event of an explosion inside the structure. Gravity action causes them to swing shut again thus confining fire extinguishing chemicals.

Fireproof wool blankets are attached to each exit door for use by employees whose clothes may become ignited.

Heat sensing bulbs are strategically located throughout each building and these are connected with an actuator controlling a bank of CO_2 cylinders. Fog nozzles are placed at intervals in the CO_2 manifold lines in accordance with Underwriters' Laboratories recommendations.

In the event of failure of the CO_2 system to actuate through the heat sensing units, the extinguisher system can be tripped by remote control from outside the structure.

360° hoist hook service...

WITH- AMERICAN MONORAIL PEDESTAL JIB

Here's the answer to economical local handling service to process machines, particularly beneath heavy mill type cranes... it's the American MonoRail Pedestal Jib. These jibs are recommended for capacities between 500 to 4,000 pounds, headroom 9 and 12 feet, and boom length 8 and 12 feet... a truly precision built, skillfully engineered job. Turn to American MonoRail for any overhead handling requirements. Your American MonoRail engineers will be glad to consult with you.

For any MonoRail application write for Bulletin C-1

AMERICAN OVERHEAD HANDLING EQUIPMENT

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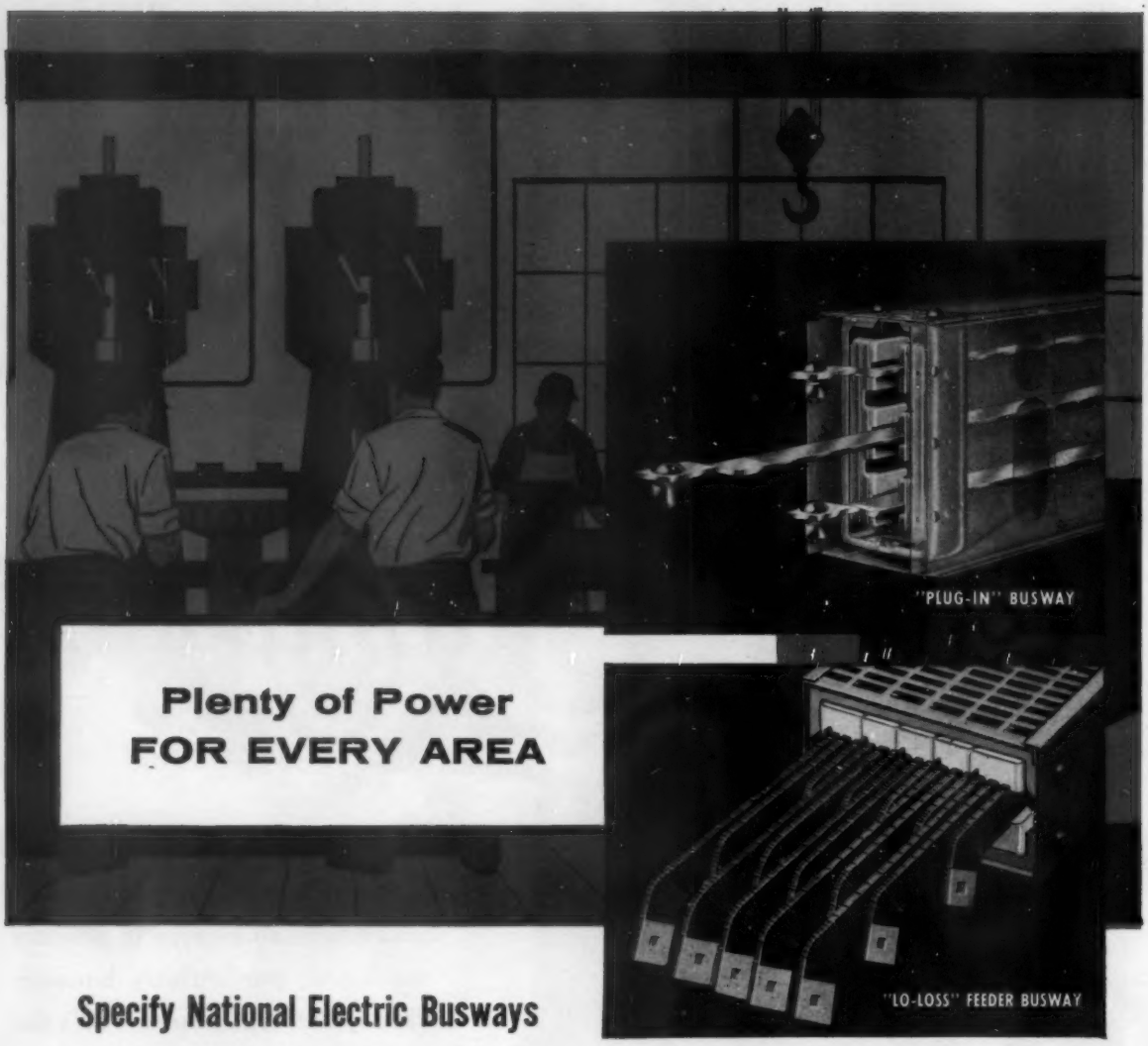

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Specify National Electric Busways

National Electric Busway systems provide plenty of power to meet the changing needs of today's production schedules with reserve capacity for future expansion. Lightweight, compact, easy-to-install, they're designed to meet the most rugged industrial and commercial requirements.

NE "Lo-Loss" Feeder Busway

- Designed for current transmission up to 4000 amperes at 600 volts or less.
- Easy to install because single bolt connectors are used to join sections. Joints are silver-plated.
- Compact—Requires only 50% of the area needed for conduit and cable installations.
- On vertical installations, exclusive self-contained insulator support frame carries entire weight of bus bars independent of housing.
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- Bus bars insulated with Fibron plastic tape. High dielectric strength and heat resistance.

NE "Plug-In" Busway

- Rolled edge copper bus bars.
- All bus bar ends are silver-plated.
- Simplified, fool-proof, sliding type "plug-in" opening doors. No removable parts or springs.
- Natural gray finish baked to a hard surface inside and out.
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For remodeling or new construction of commercial or industrial buildings, you'll find NE Busway is the most economical, convenient, flexible and salvable system available. Send for complete information today.

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JULY, 1955
(This card void after January 31, 1956

PLANT ENGINEERING

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BULLETINS

(Begins on page 21)

VALVES AND PIPING ACCESSORIES

158 Stainless Steel Valves—Catalog 55, 12-p p, offers technical data on stainless steel valves, featuring design, selection, maintenance and repair facts. Printed to form part of a forthcoming catalog, the technical section is currently being offered separately. Photos, engineering drawings, and cut-aways are provided. Cooper Alloy Corp.

159 Solenoid Valves—This 6-pp illustrated bulletin covers company's solenoid valves for use with liquids, gases or refrigerants, for stop and start operations, mixing and blending, metering or measuring, controlling pressure differential, pressure, temperature and flow. Information on proper selection, features, coil construction, lift ratings, coil frequencies and typical applications for the valves are included. A-P Controls Corp.

160 Plug Valves—This 12-pp catalog describes a non-lubricated, non-corrosive, non-seizing, low maintenance valve for handling a wide range of fluids—where quick-operating quarter turn, shut-off plug valves are required. Explains design and operating features of the valve, gives materials specifications according to fluids handled. Lists sizes for high and low pressure types, and details repair procedure. Graham Products, Div., Graham-Lemunyon, Inc.

161 Refrigeration Valves — Twenty-pp Condensed Refrigeration Catalog, Form W-3-S, illustrates and describes company's entire line of valves, filters and driers. New products are shown, along with standard equipment in the line. Charts, selection data, capacity tables are included. A-P Controls Corp.

162 Industrial Strainers — Five models of strainers for removing suspended particles from all types of liquids are covered in this brochure. They include automatic self-cleaning strainers, manually-operated self-cleaning types and twin-basket models. Brochure is a collection of several product bulletins, and provides photos, dimensions, capacities, installation suggestions and engineering information. S. P. Kinney Engineers, Inc.

163 Packless Expansion Joints — Catalog EZ-55, 12-pp, covers company's complete line of flexible pipe connections used to solve vibration and expansion control problems in industrial and process piping. Describes pressure and temperature ranges of application, lists dimensions and specifications, as well as illustrating various types of special-purpose joints available. Selection factors and installation procedures are given. T. R. Finn & Co., Inc.

METALS, METAL FINISHING

166 Dictionary of Steel Terms—Simplified steel terms are compiled and defined in this 32-pp Helpful Data Bulletin 6. Included are definitions of terms frequently used in the purchase, manufacture, treating, machining and finishing of steel, ranging from annealing and austempering through isothermal quenching and yield strength. Features photos, curves and tables covering a variety of subjects. LaSalle Steel Co.

167 Cupro Nickel Alloys—The use of cupro-nickel alloys for heat exchanger tubes in power service, due to their resistance to attack by salt water used for cooling and their superior strength at elevated temperatures, is discussed in this 12-pp bulletin. Provides tabulated data on performance in specific service in various industrial fluids such as ammoniacal solutions, brines, alkaline solutions, petroleum products, organic compounds, others. The International Nickel Co., Inc.

168 Expanded Aluminum—Technical information on expanded aluminum, standard and flattened, is illustrated and described in this bulletin. Included are sizes, dimensions and weights for different mesh sizes, and illustrations of applications. Penn Metal Co., Inc.

169 Corrosion Resistant Metal—This illustrated booklet describes applications of Hortonclad, a continuous bonded composite corrosion resistant metal, produced by a high vacuum brazing process. Points out advantages, describes method of fabrication, performance under various corrosive conditions. Chicago Bridge & Iron Co.

170 Equipping the Pickling House — Designed as a practical guide to greater production at lower cost in a wide variety of pickling operations, this 32-pp bulletin describes use of specially designed Monel equipment in processing of large and small fabricated parts, hollow ware, and forgings and castings, as well as common mill forms of steel and tin plate. Explains how Monel's corrosion resistance, strength and ductility cut dead weight, permit greater payloads, assure longer service. Application photos, diagrams and link specifications for Monel chain are included. The International Nickel Co., Inc.

171 Sandblast Equipment—Fourteen models from 150- to 1350-lb sand capacity are described and illustrated in this 20-pp catalog on sandblast equipment. Also shown are sand control valves, venturi nozzles, other accessories. Includes specifications, selection tables and table showing sand consumption and air flow. Clementina Ltd.

172 High Production Cleaning of Forgings—How to attain high cleaning rates in shops producing large and heavy forgings is described in Bulletin 744-4 on airless abrasive blast cleaning. A case history is given concerning one tool and equipment company, where such a machine cleans forgings weighing almost a ton each in 15 to 20 min. American Whelabrator & Equipment Corp.

AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

164 On Circuit Breakers — This 60-pp Speedfax catalog is designed to provide essential information on selection and application of molded case and large air circuit breakers. Application sections make extensive use of charts and tables to explain proper selection of circuit breakers for motor circuits, bus duct, conductors, and transformer secondary applications. Illustrated descriptive sections explain advantages. Also included are prices, dimensions, and ordering instructions. I-T-E Circuit Breaker Co.

165 Welding Rod Guide — The 32-pp "DirectoRod Guide" describes over 300 low heat input metal joining applications and procedures. Text and illustrations cover welding and overlaying all base metals using all heating methods. Recommendations are given for welding cast iron without preheating and dismantling, use of low-cost alloys, joining "difficult" metals. Company's many new Low Temp EutecRods and Lo Amp EutecTrodes are described. Special sections on tool tipping and wear resistant overlays are included, and practical metal joining procedures are given. Eutectic Welding Alloys Corp.

173 Drafting Made Easy—"Simplified Drafting" is a well organized 36-pp booklet presenting 11 common sense rules for simplifying drafting practices. Through the medium of sample drawings of engineered parts and assemblies, the 11 rules—from the use of word descriptions for simple parts to making freehand drawings where possible—are illustrated and a comparison made between simplified methods. American Machine & Foundry Co.

174 Handbook on Insulation—This 80-pp revision of the Magnesia Insulation Manual contains an explanation of chemical and physical properties of 85 per cent Magnesia, together with new conductivity, density, and fire-resistance data. Water-resistant magnesia insulation for underground conduits and locations subject to excessive moisture is described. A section is devoted to application techniques for hot piping and equipment. Includes tables of simplified thicknesses—given in nominal and actual thicknesses. Recalculated heat loss tables are included. Available to qualified plant engineers, please state your job title. Magnesia Insulation Manufacturers Ass'n.

To order these bulletins circle item numbers on the handy Reader Service Cards provided on the facing page.

VIBRATORY EQUIPMENT

176 Electric Vibrators — Eight-pp Catalog 11 describes company's line of electric vibrators and gives specifications and prices. Covers silent, eccentric weight vibrators, electro-magnetic vibrators, vibrating tables, and pneumatic vibrators. Furnishes graphic illustrations of vibrators in action, as well as information on mounting. The Cleveland Vibrator Co.

177 Vibratory Equipment—Pocket-size Condensed Catalog 554 contains 50 pp of technical data, descriptive text and photos of vibratory equipment, feeders, conveyors, power tools, shaft seals, other materials handling equipment. Syntron Co.

INSTRUMENTS, CONTROLS

178 Industrial Controls—The 1955 edition of company's Industrial Controls Catalog, 46-pp, covers electrically operated valves for gas, air, oil, water, steam, and other fluids in various applications. Included are such items as gas valves for boilers, a series of three and four-way pneumatic valves for machinery, air pressure regulators. Information on explosion-proof housings is given for all of the valves. General Controls Co.

179 Manual Controllers—Drum, foot, and limit switches for various applications satisfied by manually operated control are described in 48-pp Catalog 5509. Includes descriptions and photos, connection diagrams, engineering and application data, as well as specifications. Furnas Electric Co.

180 Meters, Pyrometers—Bulletin G-9, 8 pp, describes electrical indicating panel meters and pyrometers. Lists various types of clear plastic case panel mounting meters as well as black bakelite case styles, and also shows some new ruggedized and sealed models. Includes ordering data. Assembly Products, Inc.

181 Remote Feed Formulation — Eight-pp Bulletin 0155 describes a proportioning system that permits remote dialing and weighing of individual feed ingredients. Besides discussing operation, bulletin describes three different installations of varied formulating capacities. Contains photos and three drawings illustrating system's panels, scales, feeders, control dials, counting and recording units and complete installations. Richardson Scale Co.

182 Electric Tachometers—Twenty-pp Bulletin 540 features companys small, rugged electric tachometers for production control, speed indicating, or checking applications. Included are ten Model M 1200 magneto types with accessories for connecting magnetos to the drive source through direct coupling, pulleys, chain-and-sprockets, spur gears, or friction contact. Several panel indicators with scale lengths from 3½ to 17½ in. are described. The Electric Tachometer Corp.

183 Automatic Bagging Scale — Bulletin 3749A, 6 pp, describes company's automatic bagging scale for high-speed bagging with consistent weighing accuracy. Includes photos and an engineering drawing showing top, front and side views. Three line drawings suggest feeding arrangements for granular, powdered and pellet-size materials. Accessories are described. Richardson Scale Co.

METAL WORKING AND MACHINE SHOP EQUIPMENT

184 How To Machine Titanium—Machining recommendations for titanium and titanium alloys are presented in this 8-pp bulletin. Recommendations are based on basic machining data accumulated through fabrication experience and research. Contains specific data on turning, milling, tapping, grinding, reaming and sawing. Tables featuring technical data are also included. Mallory-Sharon Titanium Corp.

BULLETINS

(Begins on page 21)

185 Tools, Dies—This profusely illustrated 38-pp brochure covers such subjects as custom, standard and special purpose lamination dies; various phases of tungsten carbide fabrication; compacting dies for metal and ceramic operations; jigs and fixtures; precision gages; custom jig-grinding and boring; precision testing equipment, others. Cleveland Tool and Die Co.

186 Die Springs—Form SP/34A, 16 pp, shows company's complete line of die springs, including medium pressure, medium-high pressure and high pressure die springs. A new, simplified method of spring selection is included to help in choosing the correct size and capacity springs for specific operations. Tables convert compressed length to free length for the three types, and show load for various degrees of compression. A net price list is included. Danly Machine Specialties, Inc.

187 Punches and Dies — Plant engineers concerned with punches and dies will be interested in this 16-pp catalog because of the diversified line presented. Book is organized in sections by maximum hole sizes for standardized types of punches, covering up to 1-in. round holes and 1¼-in. square holes. Space is devoted to rounds and squares up to 4 in., and final pages show 16 standardized punch and die sets for fluorescent fixture starter holes, electrical outlet knockouts. Whitney Metal Tool Co.

TAPES

188 Tape Products—Bulletin 455, 8 pp, describes company's major tape products, providing performance and application information on Bi-Seal self-bonding insulating tape, electrical filler tape, Bi-Prene Types C and H electrical jacketing tape, general purpose vinyl electrical tape, and high voltage splicing tape. Several typical applications are shown. The Bishop Mfg. Corp.

189 Layout Tapes — This 8-pp illustrated bulletin presents company's line of layout tapes for industrial planning. Discusses advantages of using layout tape in making up both transparent and opaque plant layouts, and describes correct procedures. Includes tapes showing lines, arrows, numbers, letters, and structural and material conveyor symbols. Gives prices. Labelon Tape Co.

OTHER EQUIPMENT

190 Protective Lining — T-Lock Amer-Plate, a protective lining for concrete pipe and structures, is described as to properties and uses in this 8-pp folder. Photos show production of this acid-resisting sheet from synthetic resins, pigments and plasticizers. Other photos show some installations. A table shows sheet sizes for both the ¾ and full lining of pipe diameters from 30 to 72 in. Amercoat Div., American Pipe and Construction Co.

191 Pneumatic Standards—This 12-pp revised edition of the J. I. C. Pneumatic Standards for industrial equipment incorporates all revisions made in the January 1955 meeting of the Joint Industry Conference. Two pages are devoted to graphical symbols, a sample circuit employing these symbols, a glossary of terms, and other data. Booklet is hole punched for ring binders. Miller Fluid Power Co.

192 Cooling Control—Supplement 1 to Bulletin 700-A describes a new self-powered cooling control which holds temperature of cooling water in jackets or coils of compressors, oil coolers, condensers, others and which costs less than $40. Includes typical hook-up sketches. Sarco Co., Inc.

193 Protective Material—This 12-pp brochure describes field usages of Safe-T-Seal, a chemical compound which impregnates any standard electrical insulation, fortifying it against premature disintegration due to humidity, moisture, extreme temperature changes or other external factors which cut motor life. Safe-T-Seal Div., MB Aircraft Services, Inc.

194 Crystalite Refractory—Bulletin CR11, 12 pp, covers company's line of high-temperature Crystalite refractories, telling how improved techniques result in high resistance to thermal spalling and structural spalling, and to deformation at high temperatures. Tables list physical and chemical properties of Crystalite grog, Crystalite refractory, and Crystalite A refractory (a high-temperature, high-strength type). Includes photos, thermal conductivity chart. Richard C. Remmey Son Co.

195 Pulverizers, Feeders—This revised general catalog contains sections on company's Pulva-Sizers for granulating, wet milling and fine grinding; Com-Bin feeders for storing and feeding mastic, plastic, sticky materials or dry solids; and auxiliary equipment. The section on Com-Bin feeder now includes additional surge capacity and dimensional data for all sizes from ½ cu ft to 857 cu ft capacity. Pictures and drawings are used freely in the description of construction and application of this equipment. Pulva Corp.

196 Rust Inhibitor — Corrosion prevention through use of company's VPI packaging papers and barriers, coated with an organic chemical compound that vaporizes slowly, is the subject of this illustrated 20-pp bulletin. Discusses vapor phase inhibitors and chemical action that occurs to halt rusting on ferrous metals and aluminum. Cites specific cases of material and packaging cost-savings in industry. Packaging requirements, protective life expectancy, and composition of the various wraps are also covered. Angier Corp.

197 Vacuum Metallizing—Catalog 551, 8 pp, describes and illustrates mass production and experimental type metallizing units. Information is given on the special planetary interior mechanism originated by company. Also discusses vacuum metallizing process, pointing out versatility and time and money saving features. High Vacuum Equipment Corp.

198 Storing Abrasives — "How to Store Coated Abrasives," 8 pp, explains how performance of coated abrasives depends greatly on conditions under which they are stored prior to use. Describes temperature and humidity limits for proper storage and suggests an ideal storage room location. Armour & Co.

199 Economy of LP Gas—"The Aircraft Story," 8 pp, gives the report of a test made at one aircraft company, and results which another aircraft company obtained after converting their fleet of internal plant trucks to LP gas operation. Explains advantages of LP gas as an engine fuel and steps necessary in conversion of equipment to LP gas operation. American Liquid Gas Corp.

200 Single-Stage Steam Turbines—Bulletin 1954-C, 8-pp, describes company's single-stage steam turbines with steel casing construction. A cutaway view of a typical unit shows standard features. Information on availability of various frames for single-stage applications, details on variable speed governors are included. Photos and descriptions of special features,

Drying oven with silhouette plates removed to show interior of oven. Baking oven is directly behind the instrument panel cabinet.

In order to meet the increased demand for its products, a prominent fan and blower company recently renovized its metal products finishing department.

The company installed two Sly Convectioneered Ovens: (1) a water dry-off oven — 24'-8" long, 9' wide, 8' high — to remove the moisture from the parts after leaving the washer and (2) a paint baking oven — 64'-8" long, 9' wide, 8' high — located adjacent to the dry-off oven.

Both ovens have the same basic design and differ only in length and heater capacity.

Automatic temperature and safety controls are part of the air heater equipment and protect the systems against flame, fuel, power, or mechanical failure. Actual runs show that from a room temperature of 70° F. a temperature of 350° F. is achieved in 12 minutes and maintained uniformly. Both drying and baking ovens are set up for 8-minute cycles.

Results of this installation: production materially increased and better finishes obtained, at very substantial savings! *May we discuss your requirements with you?*

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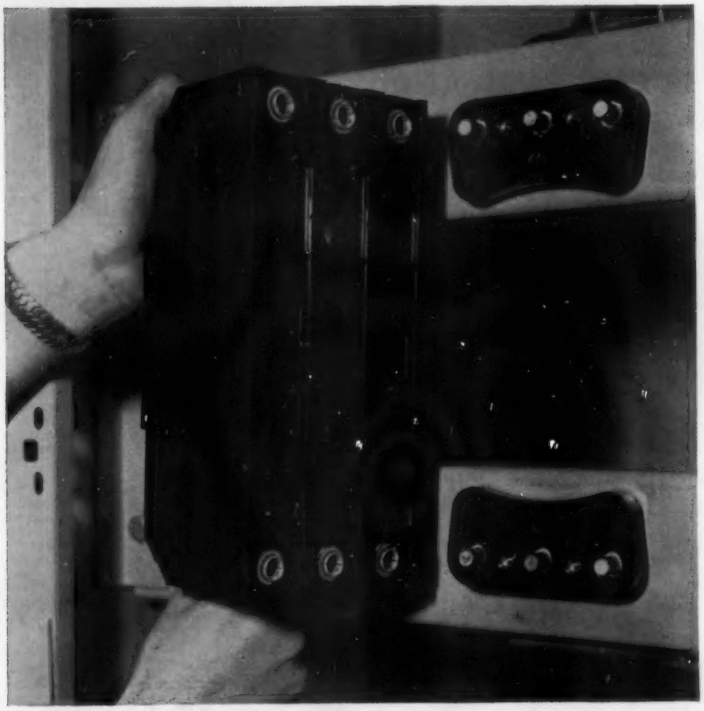
Specify I-T-E Plug-In Mounting for Molded Case Circuit Breaker Switchboards



IT'S EASY TO MOUNT an I-T-E Molded Case Circuit Breaker when it is equipped with plug-in arrangement. Simply place the integral connectors over the stationary jacks and seat the breaker. It's safe too. All terminals are shielded to provide maximum protection to the worker.

Why settle for less! I-T-E Molded Case Circuit Breakers designed for plug-in mounting in switchboard applications provide features and advantages you get only in this modern, streamlined construction. Plug-in mounting is a time-proved method employed for many years in maritime switchgear, and is approved by Underwriters Laboratories Inc.

Here are some of the advantages of I-T-E Plug-In Mounting: *Added Safety.* Breaker terminals are concealed. No live parts exposed. *Flexibility.* Breaker ratings can easily be changed within their respective frame sizes. *Ease of Installation.* Breakers simply *plug in.* Molded supporting block assures automatic alignment.

Investigate I-T-E Plug-In Mounting before specifying your next molded case breaker switchboard. I-T-E plug-in molded case circuit breakers are available in ratings from 15 to 600 amp, up to 600 v a-c, up to 250 v d-c.

For details, contact your I-T-E representative or leading independent switchboard manufacturers. Or write Small Air Circuit Breaker Division, I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

FLEXIBILITY. Withdraw one breaker, insert another of the same frame size with the desired continuous ampere rating. No wiring changes, no tools needed. All I-T-E Molded Case Circuit Breakers can be supplied with plug-in mounting arrangement.

COMBINE TWO TYPES OF BREAKER in the same switchboard. Large air circuit breaker pantograph mounted for horizontal drawout. Molded case circuit breakers plug in mounted for easy installation and replacement.

I-T-E CIRCUIT BREAKER COMPANY • **Small Air Circuit Breaker Division**

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Ordinary valve worries of leaking packing, clogged bonnets and corroded working parts are eliminated by the unique design of the Hills-McCanna Saunders Patent diaphragm valve. A tough, resilient diaphragm completely *isolates* the bonnet and its working parts from the valve body. The *cushion* closure is drip tight. Surface irregularities or scale are no cause of leakage because the diaphragm *accommodates* itself to them . . . like a tire to small stones. Packing worries are *easily* forgotten, too—no packing is needed because no fluid can enter the bonnet.

Available with choice of 15 diaphragm materials, body materials of *any* machinable alloy and a choice of linings, Hills-McCanna valves range in sizes from ⅜" through 14". May be used at pressures to 150 psi, temperatures to 350° F. Choice of remote, handwheel or lever operators.

If *you* valve corrosives, write for further information today! HILLS-McCANNA CO., 2450 Nelson St., Chicago 18, Illinois.

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BULLETINS

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along with a longitudinal diagram, present a picture of the machine's operation. A chart lists dimensions of single units, and photos show typical installation. Worthington Corp.

201 **Ozone Put to Work**—"The Promise of Ozone," 16 pp, shows how research has found ozone effective in the control of mold, bacteria, mildew, and odors, as well as safe to human beings in controlled amounts. Six typical case histories covering use of ozone, are cited. Booklet is generously illustrated with photos, drawings, charts. Melco Sales, Inc.

202 **For Surface Coatings**—Revised Bulletin 435, 6 pp, describes colloidal graphite for surface coatings and impregnation. Lists many uses in which colloidal graphite is valuable as an impregnating medium for a variety of materials, including porous minerals, cloth, leather, asbestos, paper. Acheson Colloids Co.

203 **Electrical and Lubricating Devices**—Condensed Catalog 55, 8 pp, is a descriptive listing of company's electrical and lubricating devices, featuring illustrations, catalog numbers, sizes, general engineering data, ordering information, and list price information. Trico Fuse Mfg. Co.

204 **Silica Activator**—Bulletin 63-11 describes company's silica activator used in the continuous preparation and feeding of activated silica, a coagulant aid in water purification and waste treament processes. Contains photos and dimension drawings. Omega Machine Co.

205 **Shell Molding System**—Book 2462, 8-pp, describes a fully integrated, automatic shell molding system capable of producing up to 240 quality molds per hour. The shell molding operation is explained by a cutaway drawing and detail photos of each step. Another drawing covers sand preparation and recycling system, and a typical production layout shows one way the system can be arranged. Specifications are given on sand-resin handling, heating equipment and the automatic controls. Link-Belt Co.

206 **Cracking and Embrittlement**—The damage to equipment and possible injury to personnel that can result from cracking and embrittlement are discussed in 8-pp pocket-size Bulletin 290112. Outlines water system trouble spots and factors that can produce breakage and failure in components of heaters, boilers, condensers, process equipment, and interconnecting piping. Hall Laboratories, Inc.

207 **American Water Power**—"Water Over the Dam," 24 pp, traces the development of our water power from colonial days to the emergence of the electric power era half a century ago. Beginning with a reference to a grist mill in Nova Scotia around 1605, this well illustrated booklet highlights water power developments from that period until the early twentieth century. Many interesting diagrams and photos of early water wheels are included. Allis-Chalmers Mfg. Co.

208 **Adhesives for Transparent Films**—"How to Handle Adhesives for Transparent Films" describes various types of adhesives for applications in transparent films. The most interesting feature of the 20-pp, pocket-size booklet is a chart describing properties and characteristics of all principal types of transparent film including Mylar, cellophane, pliofilm, polyethylene, cellulose acetate. National Adhesives, Div., National Starch Products, Inc.

209 **Boltless Shelving**—Klip-Bilt, a boltless steel shelving erected at low cost without use of tool is described in 4-pp Catalog 701. Illustrates the three types of clips utilized and shows how they hold the shelves, dividers and panels. Three types of shelf construction available are also shown and dimensions listed. The Frick-Gallagher Mfg. Co.

210 **Power Room Exhausters**—Detailed information and performance tables of company's axial mushroom power room exhausters designed specifically for warehouses, industrial buildings, laundries, power plants, and wherever roof ventilation is applicable, either with or without duct systems, are contained in 8-pp Bulletin CAM-102. Chicago Blower Corp.

Blowdown

WAS THE PROBLEM

Boiler blowdown, an important engineering consideration, is one of the numerous details thoroughly investigated by the Drew engineer when he makes a plant survey.

Take the recent case of a West Coast Oil refinery, for many years troubled by intermittent carryover and boiler sludge deposits. The Drew man was called in for consultation and advice.

A comprehensive plant survey revealed that improper location of internal continuous blowdown piping in the boilers, was causing sludge build-up and high solids concentrations.

Complete operating details were submitted to the Drew Technical Service Department, and specific recommendations were made which included the proper sizing and location of continuous blowdown piping, as well as boiler water concentration controls; a clear-cut case of a problem solved through engineering.

Why not take advantage of Drew experience in all matters relating to boiler feedwater treatment? Send for our booklet, "Complete Boiler Water Treatment"—no obligation, of course.

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 165-166.

ELECTRICAL

301 Motor Buying Guide—Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general—and definite—purpose fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

302 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

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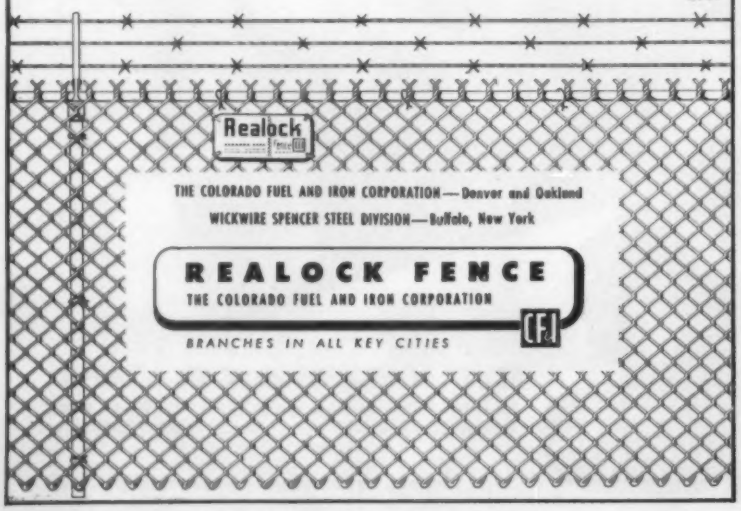

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304 Batteries for Control Switchgear—This company's PlastiCal (lead calcium) and PlastiCell (high-tensile alloy grid) batteries for control, switchgear, and auxiliary power are described as to design, application and performance in Bulletins CP-536 and CP-537. Specifications given. C & D Batteries, Inc.

305 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

306 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

307 What You Should Know About Circuit Breakers—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

308 Toggle Switch—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

309 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

310 Wire-Wound Components—Catalog R-200, a 36-pp guide to manufacturer's electronic components, describes subminiature resistors, precision and power resistors, IF and RF transformers and coils. Tables and charts give specifications. I-T-E Circuit Breaker Co.

311 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

312 The Answers on Wiring—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths are included. General Cable Corp.

313 Flexible Cords—This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

LIGHTING, COMMUNICATION

315 Lighting Unit Standards—A complete compilation of new RLM Specifications is pre-

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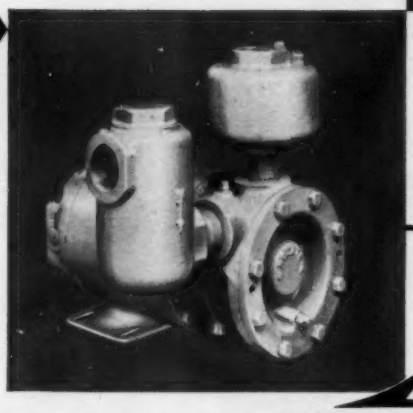

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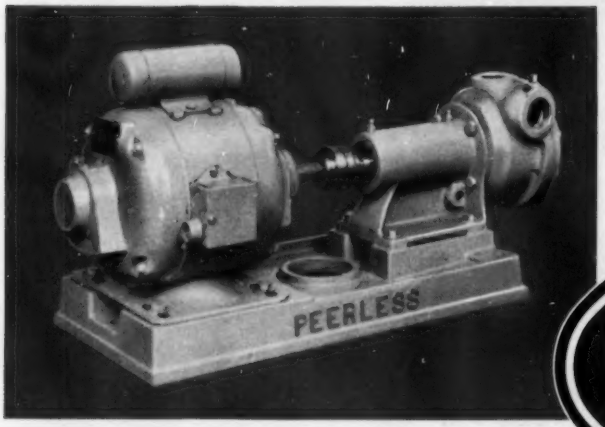

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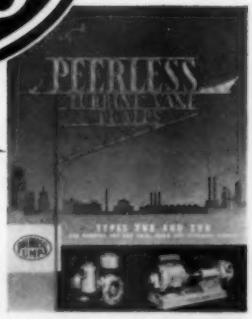

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DATA FILE

(Begins on page 172

sented in the 48-pp 1955 edition of this authoritative booklet. Covers 46 different types and sizes of incandescent and fluorescent industrial lighting units. In addition, booklet explains reasons for the standards, discusses the basis for the specifications and the objectives of the manufacturers participating in the RLM Inspection and Certification Service. RLM Standards Institute, Inc.

316 **How to Use Sound Signals**—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

317 **Television Equipment** — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

INSTRUMENTS, CONTROLS

318 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

320 **For Industrial Metering**—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

321 **Orifice Meters**—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

322 **Thermal Controls** — Descriptive information and basic technical data on company's Thermoswitch controls are presented in 52-pp Catalog 400. Generously illustrated, this booklet explains basic principle of the controls and why they are sensitive only to heat. Selection and application suggestions are provided, also ordering instructions. Products listed include cartridge, hex-head, block head, flange head, all-purpose, junction box, high temperature and other types of the controls. Fenwal Inc.

323 **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

325 **Zone Control Equipment**—Economical operation of the heating plant through use of a zone heating control system is the subject of illustrated 12-pp Apparatus Bulletin T-385. Describes a standard and clock model, discusses electronic principle of the control system, lists specifications. Schematic drawings point out applications, show dimensions of cabinets and of bulbs and accessories. Johnson Service Co.

MECHANICAL POWER TRANSMISSION

327 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these

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It was almost as if some superhuman hand were holding it back, preventing the massive 5-ton table from moving smoothly on its ways—causing it first to stick and then jump forward erratically.

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DATA FILE

(Begins on page 172)

couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

328 **Roller Chains, Sprockets**—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum Lore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

330 **Improved Motor Pulleys**—The complete redesign of this company's standard line of Vari-Speed motor pulleys is described in 28-pp Bulletin V-545. Replete with illustrations, some in full color, this booklet covers construction details, lubrication, controls available. Provides instructions on how to select proper unit, complete rating tables and dimensional diagrams. Also includes data on the Vari-Speed Jr. Reeves Pulley Co.

331 **Adjustable V-Belt**—This 8-pp catalog covers company's new Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows correct lengths for these belts. Manheim Mfg. & Belting Co.

FANS, BLOWERS

332 **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stack-booster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

333 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

PUMPS, COMPRESSORS

335 **Steam Pump**—Bulletin 230 describes a horizontal duplex steam pump with piston valve steam chest. Explains advantages of this construction, including high recovery of fuel cost when exhaust steam is utilized. Provides sectional and exterior views of the pump, also specifications, capacities and dimensions. Warren Steam Pump Co., Inc.

336 **For Abusive Pumping Jobs** — Catalog 4906, 36-pp, covers centrifugal pumps for wide, industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

337 **Rotary Pumps**—This bulletin gives information and volumetric displacement specifications for heavy duty industrial pumps for tough applications, including handling paints, acids, hot varnish, paper pulp, most abrasive slurries, solvents, plastics. Bump Pump Co.

338 **On Vertical Pumps**—This 16-pp bulletin describes and illustrates application of vertical industrial service pumps for liquid transfer from short settings in both industrial and process services. Points out advantages and describes three basic designs. Stresses versatility of the pumps due to design flexibility. Also gives general recommendations for obtaining optimum performance, and includes photos of typical installations. Peerless Pump Div., Food Machinery and Chemical Corp.

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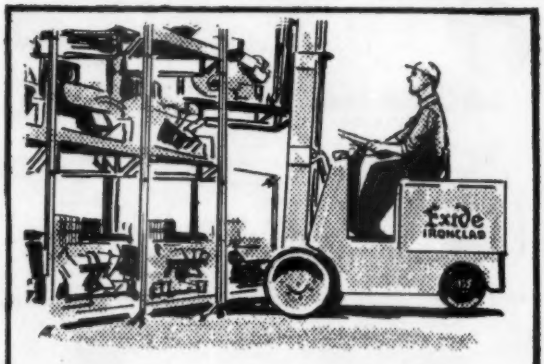

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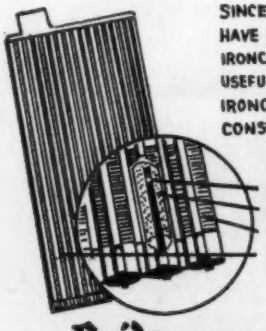

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Exide INDUSTRIAL DIVISION. The Electric Storage Battery Company, Philadelphia 2, Pa.

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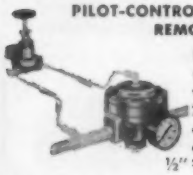

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(Begins on page 172)

339 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

340 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

PACKINGS

341 **Packing for Acids**—Bulletin CP552 Section A describes company's line of Teflon ring packing for acids and strong chemicals. Lists standard ring type styles, discusses installation, and includes ordering information as well as specifications. Chemical & Power Products, Inc.

343 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M. D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

BOILERS, GENERATORS

345 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

346 **Water Tube-Steam Generation**—Bulletin SB-51, 16 pp, discusses features of Keystone two-drum water tube steam generator for delivery of low cost steam. Cites advantages of conservative boiler rating (full five sq ft of heating surface for each developed horsepower), automatic controls, easy installation, fast steaming qualities, compact size. Gives specifications on all materials furnished, includes accessories. Erie City Iron Works.

347 **Steam Generators**—"Cyclonic combustion," a new method of heat transfer is discussed in this bulletin. Descriptive drawings show how air is introduced into combustion chamber at high speeds in revolving spiral vortex, radiating heat to fire tube through direct radiation and convection. Cyclotherm.

348 **Automatic Boilers**—Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

WATER CONDITIONING

349 **Boiler Water Treatment**—A complete system of boiler water conditioning is discussed in this illustrated 12-pp bulletin. Stresses need for purifying boiler water to render it suitable for use in a steam plant, so as to cut down boiler repairs and replacements, heat transfer losses, shutdowns. Describes company's threefold program of survey, treatment and control. E. F. Drew & Co., Inc.

350 **Testing Equipment**—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.; cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance

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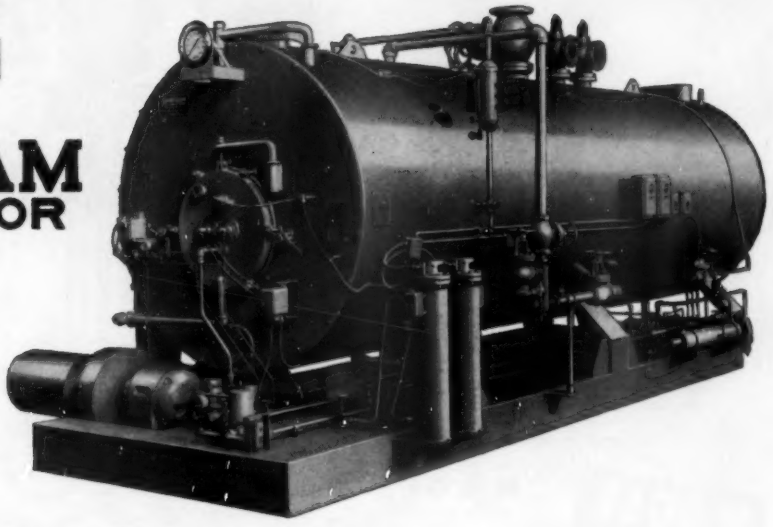

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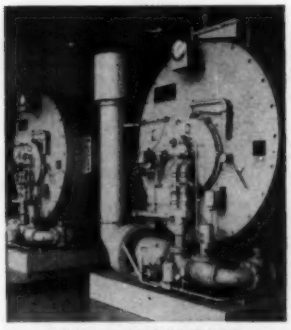
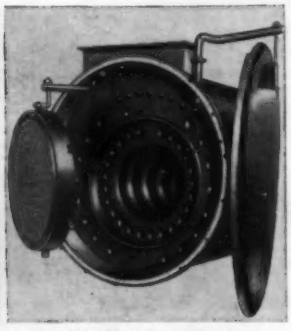
HEAT — POWER

20 sizes, 10 to 600 H.P., 15 to 200# W.P., oil, gas or oil-gas combinations with quick fuel switchover feature.



FULLY ASSEMBLED

All piping, wiring and operating parts completely assembled and tested at factory — units shipped in ready-to-fire condition!



EASY TO CLEAN

Ames-designed davit hinged flue covers and baffle provide quick and complete access to the furnace and all tubes.

SAVINGS IN FIRST COST!

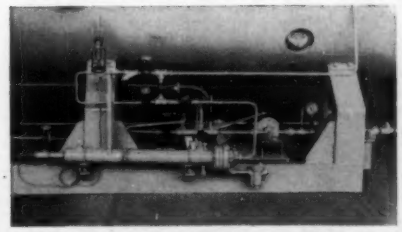
Your purchase price includes complete unit — no hidden "extras" to buy later on!

SAVINGS AT INSTALLATIONS

Just set on level concrete floor, connect to service lines and breeching. Nothing to assemble. No brick work required.

SAVINGS IN OPERATION

A minimum of supervision — lower manhour requirements for maintenance — easily replaced inexpensive plastic refractories — 80% thermal efficiency.



AMPLE ROOM

underneath for servicing auxiliary equipment. Control panel at eye level.

AUTOMATIC

operation, fully safeguarded, is provided by factory installed and tested control system.

Write for bulletin today!

AMES IRON WORKS, INC.
Oswego, N. Y., Box M-75

Gentlemen:

Please send me further information on AMESTEAM GENERATORS and name of nearest representative.

NAME.....

COMPANY.....

ADDRESS.....

AMES IRON WORKS INC.

BOX M-75 OSWEGO, N. Y.

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. . . HAVE SOMETHING IN COMMON

They are both built to take it . . . for long, gruelling service. Both are engineered to the Nth degree. Boeing selected a Nagle 2" type "SW-OB" vertical shaft, centrifugal pump for pumping a chromium solution into dip tanks. Many parts of Boeing planes are processed with chromium to provide a durable exterior finish. Production schedules rule out leakage, failures, packing troubles. This Nagle Pump was designed to eliminate these troubles. Nagle Pumps are built for abusive service only—handling abrasive, or corrosive materials or hot liquids. Get the facts—send for Catalog 5206.

NAGLE PUMPS

NAGLE PUMPS, INC.
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PUMPS FOR ABRASIVE AND CORROSIVE APPLICATIONS

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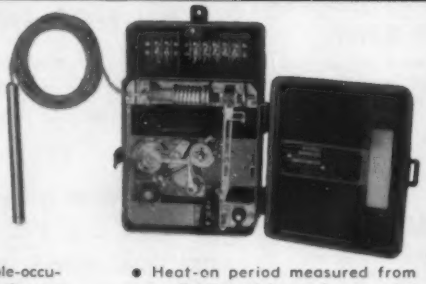
BARBER COLMAN

ECONOSTAT INSIDE-OUTSIDE

Zone Temperature Control

SUPPLIES HEAT IN PROPORTION TO HEAT LOSS *Automatically*



- Regulates heating in multiple-occupancy buildings, based upon changes in outdoor temperature
- Supplies heat at intervals — avoids waste of "overheating" — keeps people comfortable
- Settings for night depression and morning warm-up cycles effect further economies
- Heat-on period measured from availability of heat where needed rather than turn-on of heat source —avoids "heat-lag"
- Often pays for itself in one or two heating seasons with fuel savings—brings untold new comfort
- Motor-operated Zone Control valves used with Econostat are available in all sizes and body patterns

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Consult nearest Field Office or write . . .

Barber-Colman Company
DEPT. S, 1339 ROCK STREET, ROCKFORD, ILLINOIS, U. S. A.

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DATA FILE

(Begins on page 172)

of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

HEATERS, HEATING

352 **Unit Heaters** — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

353 **Gas Heaters**—How, why and when to use gas-fired unit heaters is outlined in pocket-sized Bulletin SA-541-A, 20 pp. Includes hints on heater selection and installation, schematic diagram explaining how heater works, instructions for estimating heat loss and computing gas requirements. Reznor Mfg. Co.

354 **Hot Water Heating Systems**—Catalog GK-954, 24 pp, features a complete line of equipment for forced hot water heating systems and chilled water cooling systems. Nine pages are devoted to information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressures are a few of the new applications. Valves, fittings, air vents, air tanks and water heaters are also described in detail. Bell & Gossett Co.

355 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

AIR CONDITIONING AND DUST CONTROL

356 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters, for the removal of air-borne impurities given. Dollinger Corp.

357 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

358 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust source. American Air Filter Co., Inc.

359 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

360 **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. A special section tells how to design your own system. Aget Mfg. Co.

VIBRATION CONTROL

362 **Engineered Vibration Control**—Bulletin 104 presents spring, cork and rubber mountings, discusses advantages of each and use alone or in combinations. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co.

Now!

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14/2 SO AND LARGER

Flexible Cord

is marked for EASY SIZE IDENTIFICATION

DYNAPRENE is now listed by the U.S. Bureau of Mines and the Pennsylvania Bureau of Mines. Identification number is P-118 BM. » » » DYNAPRENE is designed and manufactured to withstand rough operating conditions, and give long dependable service, cutting machine down time and maintenance costs. » » » In mines as in industrial plants, impact and flexing are prime causes of flexible cord failure. DYNAPRENE, the WHITNEY BLAKE neoprene jacketed cord, has proved through years of rough usage its superior resistance to these two harmful factors.

And, in addition, DYNAPRENE withstands the damaging effects of water, oil, grease, sunlight, solvents, heat, ozone and abrasion. » » » DYNAPRENE in sizes 14/2 SO and larger is marked every twelve feet with name and size, a convenience that will make it easier for users to select the right size for the right job at all times. Because the neoprene jacket is permanently marked with the name DYNAPRENE you can always be sure when you use it, that you have the best in flexible cord.

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WHITNEY BLAKE CO.

NEW HAVEN 14, CONNECTICUT

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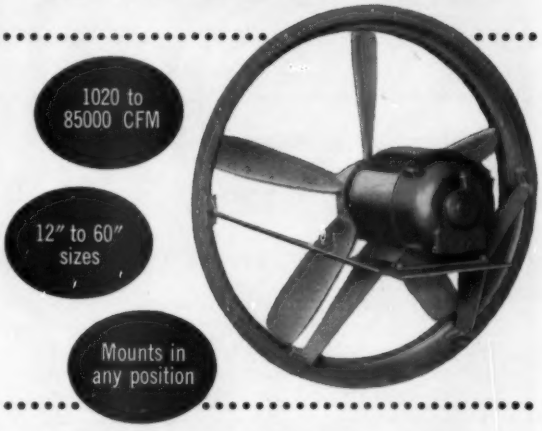
Most versatile of all industrial fans



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Use this heavy-duty fan for ventilation . . . to exhaust heat, dust, moisture, fumes and smoke. It's powerful, dependable, efficient. Use it in ductwork, hoods, roof ventilators, wall mountings or for air circulation and cooling. Engineered to move a lot of air at low cost.

You get these important features:

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- Dependable R & M *All-Weather* Motor direct connected for long, trouble-free service
- Venturi entrance ring with tip seal to create efficient air flow
- Rugged steel motor support arms welded to entrance ring
- Explosion-proof and glass-insulated motors available
- Fan and motor covered by a single Robbins & Myers guarantee

Certified Ratings PCMA

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DIVISION OF ROBBINS & MYERS, INC.

SPRINGFIELD · OHIO

Man Cooler | Sky-Blast | Vaneaxial | Tubeaxial | Extended Shaft

For more facts circle 625 on Reply Card

DATA FILE

(Begins on page 172

363 **How to Cut Vibration**—The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American Felt Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

364 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

365 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.

366 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

367 **Feeders, Rotary Valves**—Bulletin F-5, 8 pp, describes and illustrates roll and vane-type weeders and rotary valves for handling a variety of dry pulverized and granular materials. Discusses various types of feeders and lists materials handled by them. Generously illustrated with photos and drawings, this bulletin includes tables giving key dimension and capacity figures. Fuller Co.

368 **PVC Valves, Fittings**—Circular 601 describes Luncor all-molded polyvinyl chloride valves and fittings. Stresses corrosion resistance of these valves, lists some industrial fluids they handle. A large cutaway illustration shows design details of the valve. Also included are dimensions. The Lunkenheimer Co.

369 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all equipment; a maintenance section. Armstrong Machine Works.

370 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

371 **Unions and Fittings**—Twelve-pp Catalog 50 covers manufacturer's line of unions of all types, elbows, tees, fittings. Dart Union Co.

372 **Expansion Joints** — Rubber expansion joints for relieving strains and stresses in piping, absorbing vibration, eliminating noise are the subject of 8-pp Form AD-137. General advantages of rubber expansion joints are presented, and spool-type, U-type and rectangular-type joints are described as to construction and intended services. Also provided is catalog sheet on all-Teflon joints and Teflon-lined rubber joints. The Garlock Packing Co.

INSULATION

374 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

375 **Insulating Material** — Ultrafine, a new thermal and acoustical insulation made of blown glass fibers, is the subject of this bulletin. Complete with photos of insulation in use and tables showing its efficiency, gives physical properties, principal uses, handling characteristics, thermal conductivity, and acoustical efficiency. Gustin-Bacon Mfg. Co.

376 **Improved Heat Insulation** — This 8-pp bulletin describes Super-Light 85% Magnesia for temperatures to 600 F, available in cement blocks, pipe sections. Twelve advantages of this lightweight insulation are detailed. Recommended thickness, physical characteristics, prices are given. Also included is information on combination coverings with Tempchek inner layer for temperatures from 550 to 1500 F. The Philip Carey Mfg. Co.

377 **Flexible Duct Insulation** — Form F-180 describes and gives product specifications for fiber glass flexible duct insulation. Advantages are cited, and easy installation procedure is illustrated. Also included are data on thermal insulating and acoustical insulating qualities. Fiber Glass Div., Pittsburgh Plate Glass Co.

OVENS, FINISHING SYSTEMS

379 **Industrial Ovens** — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

380 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

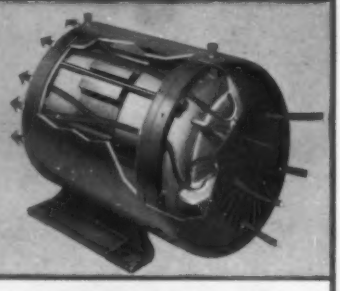
381 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens

to PLANT ENGINEERS, Howell suggests

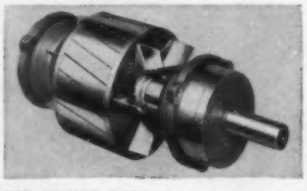
What to look for in the new re-rated motors

The space and weight saving advantages of the new NEMA re-rated frame sizes have been accomplished by various constructions. Prices may be the same . . . but why not insure getting the most for your investment. Below are some points for comparison . . . and a few of the reasons why Howell "Series 100" motors are so outstanding!

VENTILATION . . . "Cool running" means long life in motors. The steel shell of a Howell Series 100 motor and a stator design with the largest air passages yet devised put ample ventilation where its needed. Compare!



BEARINGS They should be fully protected. Dirt can't enter Howell's cartridge-type, double shielded bearings either from inside or outside the motor. On TEFC motors, cartridge remains sealed when end plates are removed. Compare!



ALL-COPPER ROTORS Howell motors have all-copper rotors. This means better heat conductivity, stability at high temperatures and, as opposed to die-cast rotors, greater design flexibility to meet special requirements. Compare!

The new Howell Series 100 TEFC Motor SMALLER • LIGHTER • COOLER • MORE STREAMLINED. TEFC and Open Drip-proof types have the same diameter . . . are completely interchangeable.

WRITE FOR THE SERIES 100 CATALOG

HOWELL MOTORS

Howell Electric Motors Company, Howell, Michigan

PRECISION BUILT MOTORS FOR INDUSTRY SINCE 1915

HOWELL Red Band MOTORS

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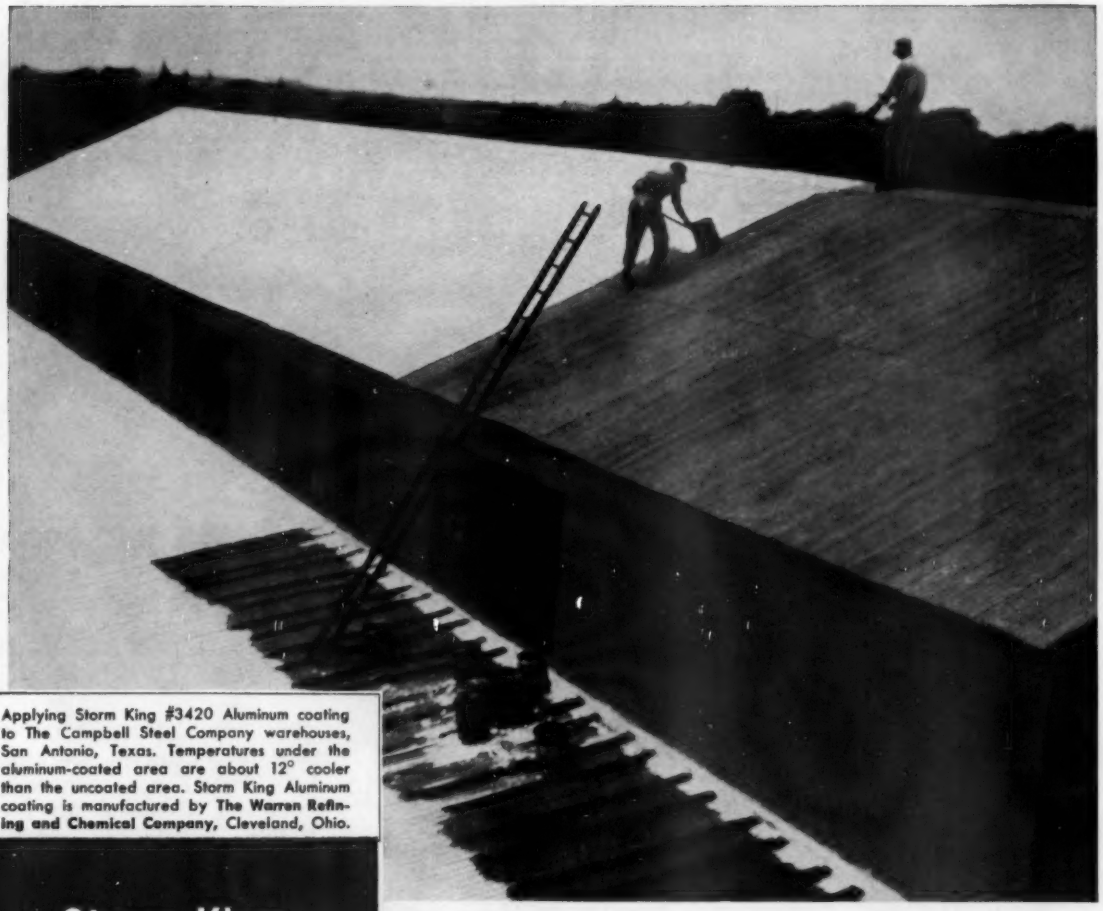

Applying Storm King #3420 Aluminum coating to The Campbell Steel Company warehouses, San Antonio, Texas. Temperatures under the aluminum-coated area are about 12° cooler than the uncoated area. Storm King Aluminum coating is manufactured by **The Warren Refining and Chemical Company**, Cleveland, Ohio.

Storm King Aluminum Coating keeps Campbell Steel warehouses up to 12° cooler...

one coat waterproofs, rustproofs, insulates

Corrugated metal warehouses of The Campbell Steel Company were in poor condition—pinholed and leaking—when one coat of aluminum asphalt coating was applied in April, 1953. Now, more than two years later, they are in good condition. The pinholes are sealed, the metal is rustproofed, and the buildings are up to 12° cooler. In an area where intense sun, prolonged dry spells and dust storms take heavy toll of protective coatings, this is an outstanding example of the life-giving qualities of good aluminum coatings.

Aluminum roof coatings like this contain asbestos fiber in an asphalt base, and brightly polished ALCOA Aluminum flakes. Once applied, it remains firm on top, but soft and pliable beneath its protective, reflective shield of aluminum. It will not sag or run under tropic sun, or crack under frigid cold.

ALCOA does not make roof coatings. But we will gladly refer you to reputable manufacturers who do. Write today. Use the coupon.

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with DOWNS SAFETY GRABS for Cranes and Hoists

Now you can tailor your lifting equipment to "fit" any shape or size materials to be moved with Downs *Safety* Grabs. No matter what your hoists are handling — pipe, rails, drums, plate or structural steel, stone, timber, boxes or odd-shaped objects of any size — there's a Downs *Safety* Grab *designed for the job.*

Downs *Safety* Grabs give you faster, easier lifting . . . and they're *safety-engineered* to provide a wider safety factor than listed capacity ratings. *They can't let go until you release the load* — real protection for workers that improves morale.

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DOWNS CRANE & HOIST CO.
MECHANICAL ENGINEERS
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DATA FILE

(Begins on page 172)

are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

MATERIALS HANDLING

382 **Engineered Monorail Applications** — A file of application literature is announced as the beginning of a new service. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of file. Available to qualified plant engineers. The American MonoRail Co.

383 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is the current edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

384 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

385 **Crane and Hoist Parts**—Bulletin G8 covers company's line of hoist grabs as well as component parts for various type cranes. Includes photos and drawings of the parts, along with descriptions and specifications. Downs Crane & Hoist Co.

387 **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 97 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features; also information on motors, controls. Whiting Corp.

388 **Sheet Lifter** — Operational and design features of company's sheet lifting equipment, which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16-pp. Cullen-Friestedt Co.

389 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

391 **Freight Elevators** — Elevators designed especially for power truck loading are described in this 8-pp illustrated bulletin. Discusses various requirements for impact, off-balance, and extra static loading and shows how design and structure of company's elevators meet requirements. Otis Elevator Co.

392 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems with their cause and remedies. The B. F. Goodrich Co.

393 **Continuous Power Conveyor** — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, take-up, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

394 **Conveyor Trolleys** — A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

395 **Metal Conveyor Belts** — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 165-166.

396 **How to Pick a Truck** — Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrates important construction and design features. The Baker-Raulang Co.

397 **Lift Truck Work Kit** — A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

BUMP PUMPS *Lower Maintenance Costs*

Rugged "Work Horse" Construction gives LONG LIFE

Many Bump Pumps have given practically trouble-free service for 5-10-15 and more years! That's why the maintenance cost is LOW! Ideal for paints, acids, hot varnish, paper pulp, plastics, oils, etc.

- Available in stainless steel, iron, special alloys.
- Non-agitated, non-pulsating flow.
- Handle materials up to 550° Fahrenheit.
- Only 2 moving parts in pump—easy to clean.

Over 40 years of making BETTER Pumps. Dealers everywhere. Write for information.

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Ametron® ELECTRONIC
CRANE SCALE

Weighs heavy loads suspended from crane hook. Printer, located in crane cab or other convenient location, records weight on tape or cards. New compact printer only 22" x 18" x 10½".

Entire assembly designed for prompt and easy installation. Now available at new low cost.

Capacities 5, 10, 15 tons.

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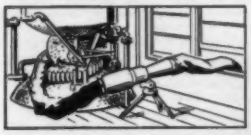
Ventilate CONFINED Places with Vano Design "C" Ventilator-Exhauster

WELDING FUMES are here removed by this Vano Ventilator-Exhauster.

Ideal for withdrawing welding fumes from confined places or directly from the welding rod. Provides greater safety, greater comfort for workers . . . leads to greater work efficiency. Can be furnished with 8" suction inlet to which 8" non-collapsible suction tubing may be attached . . . or provided with multiple inlet nozzles for 5", 4" and 3" suction hose.

Other types are also available for supplying fresh air to men working in confined places, such as tanks, manholes, drums, boilers and shipholds.

For full details on Coppus Vano Design "C" Ventilator-Exhauster write COPPUS ENGINEERING CORPORATION, 427 Park Avenue, Worcester 2, Mass.



FUMES FROM A REACTOR KETTLE are here withdrawn by tripod-mounted Vano Ventilator-Exhauster. Note non-collapsible suction tubing and discharge tubing.

ANOTHER **COPPUS** "BLUE RIBBON" PRODUCT

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Now - partlow designs

"VEST-POCKET"

explosion-proof controls for hazardous locations

Vest-pocket price! Vest-pocket size!

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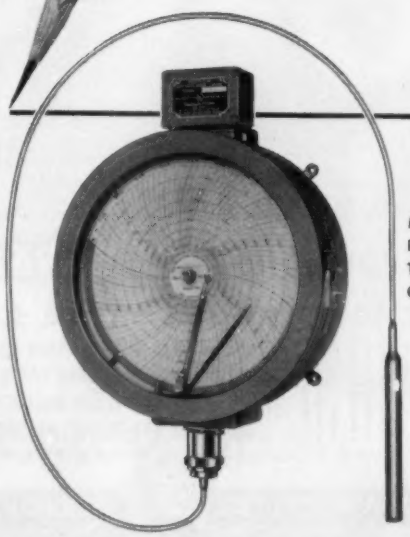
WRITE NOW FOR MONEY-SAVING FACTS

on Partlow Indicating, Non-Indicating and Recording Explosion-proof Temperature Controls. One low cost . . . no large, heavy *extra* enclosure to buy or make room for.

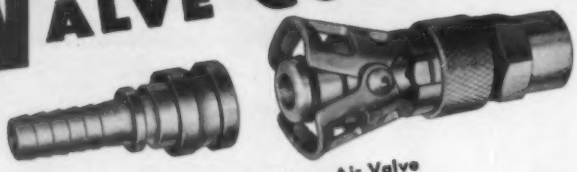


Model RVS Recording Temperature Control

For more facts circle 633 on Reply Card

NEW DESIGN

Quick-As-Wink® VALVE COUPLINGS



- ✓ Combination of 3-way Sliding Sleeve Air Valve and Quickly Detachable Hose Coupling.
- ✓ Permits Operator to Turn Air "On"—or "Off"—right at the Tool.
- ✓ Exhausts Tools Automatically.
- ✓ Speeds up Tool Changes.
- ✓ Cannot be Disconnected while Air is On.
- ✓ Free Swiveling to Prevent Hose Kinking.
- ✓ Approved by Plant Safety Authorities.

Thousands in daily use. ¼" to ¾" sizes with hose or male or female pipe threads. Write for Bulletin No. 104-D. It gives full details.

Quick-As-Wink VALVE COUPLINGS

Designed and Manufactured by

C. B. HUNT & SON, INC. • 2082 East Pershing Street, SALEM, OHIO

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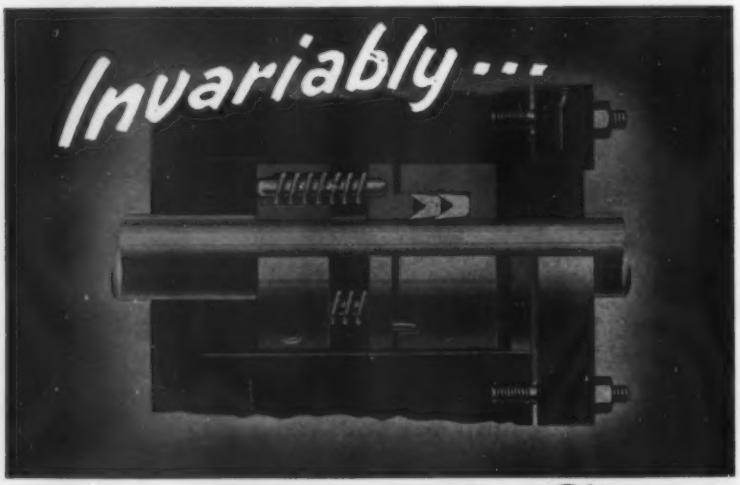

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ROTATES WITH THE SHAFT

for long dependable service

WHERE
- ....ECONOMICAL OPERATION IS DESIRED
- ....OPERATING CONDITIONS ARE HAZARDOUS
- ....LOSS OF COSTLY FLUIDS MUST BE PREVENTED
- ....COMPLETE AND PERFECT SEALING REQUIRED

GET THE "DURA SEAL" STORY—WRITE FOR BULLETIN 455-PN

DURAMETALLIC CORPORATION

KALAMAZOO MICHIGAN

For more facts circle 635 on Reply Card

DATA FILE

(Begins on page 172

398 **Increasing Warehouse Capacity** — How mass handling methods effected through the use of fork-lift trucks, increased a plant's warehouse capacity 300 per cent is told in Job Study 139. Photos show how trucks speed up loading operations. Towmotor Corp.

399 **Handling Baskets** — Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machinery, washing, plating. Wire & Iron Products, Inc.

400 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

401 **Shock Absorbing Casters** — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

MAINTENANCE

403 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

404 **Proper Care of Floors** — Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a

ARMSTRONG BROS.

Better PIPE TOOLS

Reversible Ratchet STOCKS and Adjustable DIES

Exceptionally convenient where space is limited, this stock simplifies pipe threading close to walls, in corners and whenever operating room is restricted. With *adjustable* dies (cut exact, over or under size threads) it is an ideal tool where valves and fittings are being installed or maintained.

"ARMSTRONG BROS." adjustable dies are of special Vanadium Tool Steel, have "backed-off" teeth, correct cutting angle, ample chip clearance and correct throat angle. They start and cut easily, hold their sharpness and "spin" off pipe without jamming or tearing threads.

Write for Catalog

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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LITTLE JOB?

BIG JOB?

delicate job ?

...cela ne fait rien

There's a Colson® **CASTER RIGHT for your needs**

BIG JOB?

COLSON Forgeweld Casters

The world's finest caster for extra heavy duty requirements. Wheels of cast steel, iron, rubber, molded plastic—in capacities up to 6000 pounds per caster.

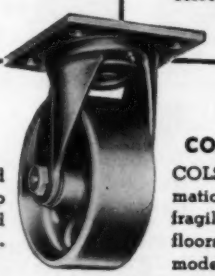
That's right! Whether you work in Paris or Peoria, whether you make pies or pig iron, there's an easy-rolling COLSON Caster that meets your needs—*exactly*. For the price of new, roll-easy COLSON Casters you can convert old, bumpy hard-to-push hand trucks to an efficient, smooth-sailing fleet—at very small cost.

Why not write today for free booklet on COLSON materials-handling equipment, or better still, look in the yellow pages (under "Casters") for the Colson office near you?

LITTLE JOB?

COLSON PressWeld Casters

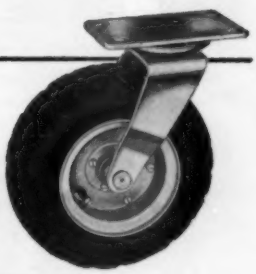
An improved low-cost caster with hardened raceways and unbreakable fork and top plate. Ideal for dollies, racks, box trucks and similar applications in the moderate capacity range.



delicate job ?

COLSON Pneumatic Casters

COLSON Pneumatic and Semi-Pneumatic casters are ideal for handling fragile products over rough, bumpy floors. Available in rigid or swivel models with 6", 8" or 10" tires.



THE COLSON CORPORATION

ELYRIA, OHIO

CASTERS • HAND TRUCKS • LIFT JACK SYSTEMS

Hydraulic, Electric and Mechanical Power Lifts and Transports

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SAVE BELTS,
bearings & power with Chesterton *Belt-Flo*

BELT-FLO is a remarkable new development in liquid dressing which enables even slack belts to deliver all generated horsepower from the motor to the machine. BELT-FLO preserves all leather, rubber or fabric belts. Does not contain rosin, asphalt, oil or any other injurious materials customarily used. Use BELT-FLO *now* and immediately stop wasteful loss of power. Use BELT-FLO *now* and stop belt deterioration due to rosin type dressings. Use BELT-FLO now and stop bearing deterioration caused by unnecessarily tight belts. Save belt dressing costs with BELT-FLO which lasts up to 20 times longer. BELT-FLO will not collect dust and dirt — will not glaze or lump up on belts, is non-inflammable — non-poisonous — non-staining — clear in color — does not dry out or lose its pulling power. SPRAGRIP is BELT-FLO in pressurized cans. Particularly recommended for V belt use and all hard-to-get-at belts. Where application safety is a factor specify SPRAGRIP. Sold by all Transmission and Industrial Supply Jobbers *everywhere*.

A. W. CHESTERTON CO.
6 Ashland St., Everett 49, Mass.
America's Oldest Manufacturer of Mechanical Packings.

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Setting machinery?

use **non-shrink**
EMBECO GROUT
NOW READY-TO-USE

send for booklet

Whatever the grouting job — heavy equipment, machinery, anchor bolts, building columns, etc. — Embeco Pre-Mixed Grout will give you *lasting* results.

Embeco Pre-Mixed Grout produces a *flowable* grout that is *non-shrink*...insures full bedplate contact... maintains alignment... has high impact-resistance.

Recommended by leading equipment manufacturers everywhere. EMBECO PRE-MIXED GROUT IS READY TO USE—you add only water. Write for 8 page illustrated booklet.

Creators and Manufacturers of Products to Improve Concrete and Mortar

THE MASTER BUILDERS CO.
CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO 9, ONTARIO

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DATA FILE

(Begins on page 172)

triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces, including cement, wood. West Disinfecting Co.

405 **Better Floor Care** — This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers, and cleansers. Finnell System, Inc.

406 **Cleaning Problem Solutions**—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

407 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the variuos types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

408 **Insulation Coating** — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes mehods of applying. Contains tabulated

MOLDED BLACK NYLON SCREWS & NUTS 10 STOCK ITEMS

6/32, 8/32, 10/32. No Conduction. No Corrosion. Eliminate Insulating Bushings.

Free Sample—WRITE

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5250 Avondale — Chicago 30

EQUIPMENT FOR SALE

FOR SALE
One Baker Model WC6124 San-I-Flo Bandelet type water cooling unit complete with surge drum. Also, One fourteen ton Frick Amonia Ice machine complete. Installing larger equipment. Make offer.

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ENGINEERS
Design and Supervision of Steam and Hydro-electric Power Plants, Industrial Plants, Mechanical and Operating Surveys, Appraisals • Plans • Reports.
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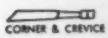

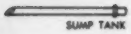

NEW TOOLS for Industry with SPENCER VACUUM

More than 100 special vacuum tools have been developed by Spencer for use in industry. They range from the floor, wall and pipe tools to the gulper which picks up volumes of material, the insulated tools for cleaning electrical equipment and hand shut-off tools for bench work. Special arrangements of hoppers and slots provide for the removal of lint, excess material and dust while the goods are passing along on the production line.

More than 100 industrial applications are illustrated in Bulletin 144.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

500-G

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RUEMELIN BLAST GENERATORS

A practical low-cost sand blast used by plant engineers for maintenance work. Cleans rust, paint, scale from piping, valves, fittings, renovating buildings, stripping paint from trucks, busses, trailers, railroad cars, structural steel, storage tanks, ship hulls, etc. Can be fitted with Wet Adapting Nozzle for eliminating dust.

Write for Bulletin 36-G

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RUEMELIN MFG. CO.

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Manufacturers and Engineers SAND BLAST AND DUST COLLECTING EQUIPMENT, WELDING FUME COLLECTORS.

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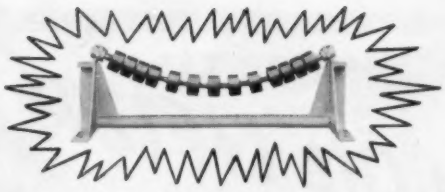

Where There's ABRASION or CORROSION

. . . This JOY IDLER OUTLASTS THEM ALL!

SHAPES TO THE LOAD . . . CUSHIONS, GUIDES BELT

The unique Joy *Limberoller* Conveyor Idler consists of neoprene discs molded on flexible steel cable. It's suspended from two bearings—one at either end, *up out of the dirt zone.* Illustrated is an installation in a dusty coke plant. In another typical job, handling abrasive foundry sand, Joy units have lasted *10 times longer* than any previous idlers and are still going strong.

Conveyor efficiency is assured and maintenance is a breeze when you switch to these Joy idlers. They exert a cushioned grip that supports the loaded belt without slipping, and keeps belt wear to a minimum. They're easier, faster and less costly to install, maintain, knock down and move than any other conveyor idler on the market, and are available for belt widths of 18", 24", 30" and 36". • Get the details! ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

OTHER ADVANTAGES:

• Resists corrosion, abrasion, flame, grease • Weighs ⅓ less than steel idler • Handles both bulk and packaged materials • Easily changed without stopping belt • Compactly stored • Saves handling time

WAD I-5616

Ask for

FREE BULLETIN LD-103A WHICH GIVES COMPLETE DETAILS ON THE UNIQUE JOY LIMBEROLLER

JOY
A Leader Since 1851
LIMBEROLLER
THE IDLER WITH FLEX APPEAL

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MOTORIZED

COIL LIFTER

SAVES
STORAGE SPACE...
HANDLES COILS FASTER... SAFER

1 Lifter Handles Both Wide and Narrow Coils With Same Speed and Economy

This C-F Coil Lifter, under control of the Crane operator handles hundreds of coils a day in a large mill... wide, narrow, and of varying tonnage. Fast, infinite adjustments of the motorized legs permit quick pick-up and set-down. Legs can be opened to any width and held... no need to open to maximum width to handle narrow coil. Maximum of 12" required between coils of any width—saves storage room.

Positive tong grip on coil tightens as lift is made... insures safe handling. Made in motorized models for crane cab or pendant operation as well as manual types with chain wheel, in capacities from 3 tons up. Powered Rotating Heads available. Opening ranges to suit your requirements. Write for Bulletin and complete information.

CULLEN-FRIESTEDT CO.
1317 South Kilbourn Avenue • Chicago 23, Illinois

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MAGNET GENERATORS
FOR ALL LIFTING MAGNET APPLICATIONS

- Designed expressly for crane lift magnet service.
- Driven from main crane engine—eliminating extra engine-driven power plants.
- Provides constant DC voltage to magnet within ± 5%.
- Available for varying main engine speeds as high as 1:3 ratio.

We invite your inquiry, write for additional information.

THE HERTNER ELECTRIC COMPANY
12690 ELMWOOD AVE. • CLEVELAND 11, OHIO
MOTORS • MOTOR GENERATORS • GENERATOR SETS
A SUBSIDIARY OF GENERAL PRECISION EQUIPMENT CORPORATION

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Try both—ON US!

Works in seconds!

Loosens Rusted Bolts
nuts . . . screws . . . parts
LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!
TiteSeal
GASKET & JOINT SEALING COMPOUND

7 BASIC BLENDS

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
- HEATPROOF AND VIBRATION-PROOF

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TWO of the many famous SOLDER SEAL products available from your Automotive, Plumbing or Hardware wholesaler.

RADIATOR SPECIALTY COMPANY
Charlotte, N. C.

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DATA FILE

(Begins on page 172

data on quantity required to cover various size tanks and pipe and data on effect of different humidities. J. W. Mortell Co.

409 **Light Scaffolds** — This series of illustrated bulletins describes company's line of aluminum alloy Up-right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

CONSTRUCTION

410 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

411 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

412 **Glass Block Fenestration**—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded ventilation below window sill. Test data is summarized and recommendations included. Kimble Glass Co.

413 **Ceiling Diffusers**—Catalog F 6597, 28-pp, contains information on ceiling diffusers, and ceiling returns. The square and rectangular ceiling diffusers and returns are designed to match appearance of acoustical ceiling tile and provide an inconspicuous means of air distribution. Linear ceiling diffusers can be used for either supply or return air, with or without integral fluorescent light units. Catalog gives performance data. Barber-Colman Co.

414 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

415 **Pre-Mixed Mortar, Grout**—Bulletins are available on two recently introduced formulations—a non-shrink ready-to-use pre-mixed mortar and a pre-mixed grout, also non-shrink and ready-to-use. An 8-pp bulletin on this new grout discusses its use in grouting heavy equipment, gives procedures for mixing and placing and pictures some common methods of grouting and forming. Includes information on effect of temperature on setting time. The bulletin on pre-mixed mortar gives advantages and recommended uses. The Master Builders Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

417 **Metal Quenching**—Valuable information on the quenching of metals is available in this 24-pp booklet. It is illustrated with charts and graphs depicting cooling curves, cooling rates, effect of bath temperatures, agitation curves, hardness penetration curves, and transformation diagrams. Contains a series of typical case studies which detail the solution to some tough quenching problems. Gulf Oil Corp.

419 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

New RLM Specifications for:

1. ALL-WHITE PORCELAIN ENAMEL REFLECTORS (Inside and Outside)
2. INCREASED UPWARD LIGHT
3. MAXIMUM BRIGHTNESS
4. BETTER SHIELDING ANGLES
5. HIGHER REFLECTION FACTORS
6. HIGHER LIGHT OUTPUT
7. CAPTIVE LATCHING and HOLDING DEVICE
8. GROUNDED BALLAST MOUNTING
9. CHANNEL DESIGNED for SLIDING HANGERS
10. REVISED LAMP SPACING
11. IMPROVED LAMPHOLDERS
12. ENTIRE UNIT RUST-PROOFED

NEW RLM SPECIFICATIONS BRING YOU BENEFITS LIKE THESE:

- ✓ Greater Brightness Control
- ✓ More Seeing Comfort
- ✓ Less Lamp Glare
- ✓ More Light for the Money
- ✓ Greater Ease of Maintenance
- ✓ Greater Safety from Electrical Hazards
- ✓ Easier, Less Costly Installation
- ✓ Less "Trapped" Light
- ✓ Easier, Safer Lamp Removal and Replacement
- ✓ Longer Life

Here's what these 12 ADVANCEMENTS in the NEW RLM SPECIFICATIONS mean to you in terms of BETTER INDUSTRIAL LIGHTING

The better lighting advantages listed above, highlight the many benefits that are yours as a result of the newly-established 1955 RLM Specifications for incandescent and fluorescent lighting units. With the ever-increasing importance of the right quality and quantity of light for greater efficiency in today's highly competitive industrial production, the selection of the proper lighting equipment becomes more important than ever. That is why these new 1955 RLM Specifications are more valuable than any set of industrial lighting specifications published during the RLM Standards 35-year history. That is the reason, too, why you benefit in more ways than ever before when you specify lighting units certified to carry the RLM Label. Today's RLM-labeled incandescent and fluorescent lighting equipment is made to the latest approved standards of illuminating engineering, to assure you of getting more light for your money now and for years to come. The newly-added specifications reflect American Industry's changing requirements for better light. That means not only higher footcandle levels, but also greater eye comfort... through greater brightness control. These, and many other advanced illuminating engineering principles are behind every RLM Label on every RLM-certified lighting unit. For a complete set of the new RLM Specifications, as well as other up-to-date lighting data, send for your free copy of the RLM Specifications Book.

Address your request to RLM Standards Institute, 326 West Madison Street, Suite 831, Chicago 6, Illinois.

R1006

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Here is an Air Vent Guaranteed to Satisfy!

Armstrong Ball Float Air Relief Traps

For Venting:

Hot water storage tanks.
Hot water heating systems.
Solvent filters.
Gasoline lines.
Centrifugal pump casings.
Anything in which air collects.

Direct action and snap action styles.

ARMSTRONG air relief traps are reliable, trouble-free air vents guaranteed to satisfy you or your money back. No plugging, no fussy maintenance. Stainless and chrome steel mechanism resists wear and corrosion—lasts a long time.

Free *Full facts in Bulletin No. 2062. Send for Free copy today.*

ARMSTRONG MACHINE WORKS
912 Maple Street • Three Rivers, Michigan

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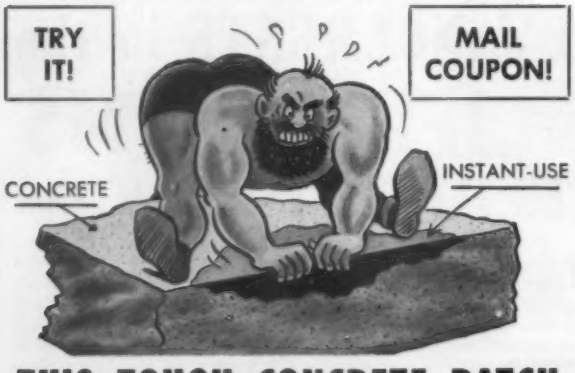
MAIL COUPON!



THIS TOUGH CONCRETE PATCH SETS INSTANTLY!

Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

MAIL COUPON FOR TRIAL OFFER AND FREE BROCHURE

INSTANT-USE

FLEXROCK COMPANY (Offices in principal cities)
3615 Cuthbert St., Philadelphia 1, Pa.

Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and Free INSTANT-USE BROCHURE—no obligation. (Clip and attach Coupon to Co. letterhead.)

Name..... Title.....
Company .....
Address .....

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DATA FILE

(Begins on page 172)

LUBRICATION

423 Bearing Lubrication — Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The Texas Co.

421 Centralized Lubrication — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication—in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump controlled by a timer. Alemite Div., Stewart-Warner Corp.

425 Automatic Lubrication — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 units, 1 to 24 feeds per minute. Hills-McCanna Co.

426 Force Feed Lubricators— 12-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Manzel Div., Frontier Industries, Inc.

428 Multi-Purpose Grease — This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, protects against corrosion. Socony-Vacuum Oil Co.

OTHER EQUIPMENT

429 Accessories for Hose, Duct —Accessories facilitating installation of company's hose and duct are described in illustrated Bulletin 41. Shows use of screw couplings, soft-end cuffs, and flanges for assembling hose in long lengths, attaching it to pipe of varying sizes, connecting to outlets of different shapes. The Flexaust Co.

430 To Keep Wire Rope at Work—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a rope. Wire Rope Div., American Chain & Cable Co., Inc.

431 Physical Properties of Synthetic Organic Chemicals—In 24 pages, booklet F-6136 presents the latest data on more than 350 organic chemicals. It features 46 new products available from this company. For easy reference, chemicals are arranged by family groups with condensed application data.

DUSTKOP® STOPS DUST

DUST COLLECTORS

SAVES INSTALLATION TIME

Stop dust quickly, at lower cost, with Dustkop. Thirty-seven standard models *ready to use* and available from stock. Dustkop conserves floor space, reduces maintenance. Collects almost all types of industrial dusts. Write for descriptive literature.

Also a complete line of Mist Collectors

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DARNELL CASTERS & E-Z ROLL WHEELS

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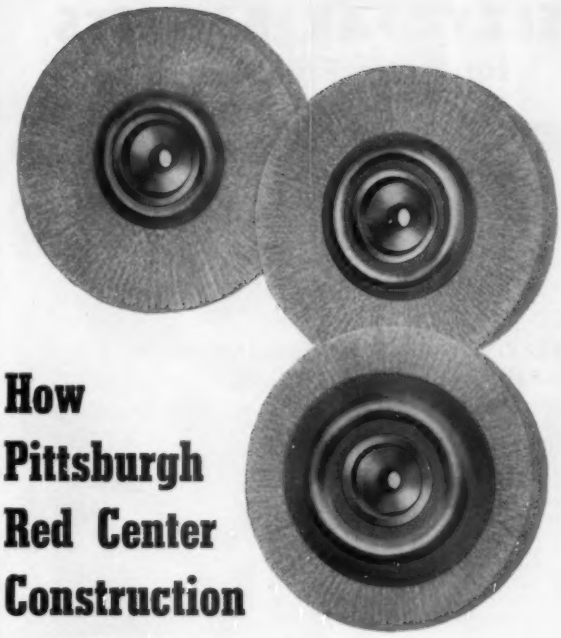

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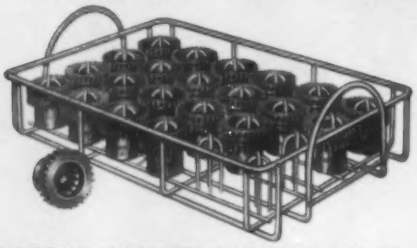

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Physical properties are given. Carbide and Carbon Chemicals Co., Union Carbide and Carbon Corp.

432 Advice on Washrooms—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms included in this service. Scott Paper Co.

433 Steam Accumulator — How the steam supply and demand can be balanced by means of company's steam accumulator is told in Bulletin RA-52-8. Stresses reduced boiler capacity required and increased boiler efficiency afforded by use of the accumulator, other advantages. Foster Wheeler Corp.

434 Blast Cleaners, Dust Collectors — Eight-pp Bulletin 100-A covers company's blast cleaning machines, dust filters, and welding fume collectors. Describes direct pressure generators, abrasive blast cabinets, blast cleaning rooms and elevators, welding fume collectors and others. Ruemelin Mfg. Co.

435 On Finishing Techniques—Eight-pp Technical Bulletins 12 and 13 on dip tank and flowcoat finishing describe the processes, discuss advantages and disadvantages of the two finishing techniques. Size and shape of dip tanks, methods of dipping, hanging of the ware, methods of agitation, tank control, as well as general suggestions and precautions are treated. The flowcoat brochure includes sections on limitations of flowcoating, operating variables, surface preparation, primers, topcoats, and thinners. Du Pont Finishes Div., E. I. Du Pont De Nemours & Co.

436 Industrial Leathers—These illustrated data sheets cover company's leather products and include belting. Also give data on leather packings for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

437 Magnetic Selection Guide—Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy selection guide. Dings Magnetic Separator Co.

438 Precision in Packaging — The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles and lists typical installations. Robert Gair Co., Inc.

439 Preheating Combustion Air—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

440 Precision Threaded Fasteners—Company's line of precision threaded fasteners is described in this 32-pp illustrated catalog, which stresses savings in costs and delivery time gained by specifying and ordering standard fasteners. Includes socket screw products, socket head cap screws, self-locking set screws, shoulder screws, flat head socket cap screws and others. Standard Pressed Steel Co.

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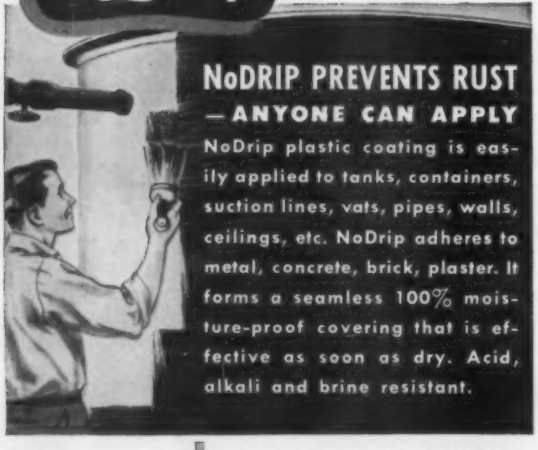

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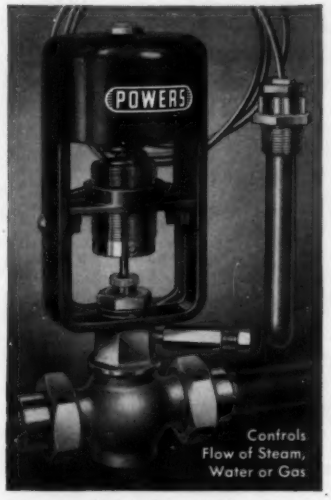

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86-1V10	1000 lb	19 fpm	28 lb
86-1V10L*	1000 lb	19 fpm	28 lb
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NEW! 'Sexauer' Easy-Tite faucet washer with Fiberglas reinforcing

This nylon plug locks the screw *automatically!*

NEW! Amazing, patented screw and washer combination cuts faucet washer replacements 75%

—with each leak eliminated, you reduce water and fuel bills up to $28.80 quarterly

Most faucet washer failures are caused by wrong length screws. 'Sexauer' Self-Locking screws* and Easy-Tite washers* —used together—cut costly washer replacements 75%! You save up to $28.80 quarterly in water and fuel alone with each leak stopped. Here's how . . .

A screw *too short* for the tapping distorts and splits the washer when tightened; the washer works loose, is torn to shreds. If *too long*, it can't grip the washer; this ruins the washer and causes hammering in the water line.

Simplifies fitting problem—cuts installation costs

'Sexauer' Self-Locking screws eliminate the problem of misfit screws. They lock *automatically* at the required depth as the nylon plug is compressed in the faucet thread. The washer is not distorted, is held firmly.

You can re-use Self-Locking bibb screws repeatedly. Made of Monel, they resist corrosion, never rust; heads won't twist off, screw driver will not distort the slot.

Self-Locking screws save time spent in fitting the proper length—10 sizes do the work of 37! Used with new, Fiberglas-reinforced 'Sexauer' Easy-Tites, they cut washer replacements 75%, fixtures last longer. Easy-Tites resist closing squeeze and excessively hot water, outlast ordinary washers 6 to 1!

Water and fuel savings

One dripping faucet wastes 8,000 gals. of water yearly. A pinhole size stream increases waste to 8,000 gals. in a *single month!* Here is what you save *quarterly* in stopping just *one* pinhole leak on a hot water faucet:

Fuel Saving		Water Saving	Total Saving
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Coal (2,469 lbs.)	22.22	6.03	28.25
Gas (21,103 cu. ft.)	21.20	6.03	27.23

Save water, fuel and labor costs; conserve costly fixtures by cutting washer replacements 75%! Use *new* 'Sexauer' Self-Locking screws and Easy-Tite faucet washers. *You save every time you do!*

WRITE FOR CATALOG. New 'Sexauer' Self-Locking screws and Easy-Tite washers are just part of the line of over 3,000 'Sexauer' Triple-Wear plumbing repair parts and patented precision tools. Send for our new, 126-page Catalog H. *Write today!*

*Reg. U. S. Pat. Off.

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Blast Away "Hot Spots"

UTILITY FAN

Stand it on the floor or mount it on the wall or ceiling. Fan turns vertically in a full circle; locks in any position. 14" to 36". Also available mounted on sturdy two-wheel carriage, 24" to 36".

COOL BLAST FANS

Portable and stationary models 22" to 40", heavy-duty model, 44" to 60". Rugged. Powerful. Practically tip-proof. Sturdy wire guards. Motors mounted outside guards for ease of maintenance.

A pipe mill in Texas. A leading non-ferrous metals producer in Connecticut. Like many other manufacturers in every state in the Union, they've learned that Hartzell cool blast and utility fans are good for production.

These Hartzell fans blast away troublesome hot spots. They dissipate the heaviest concentrations of heat, smoke and fumes. When they're on the job, production improves. Morale goes up. So does employee efficiency. Errors, accidents and absenteeism are reduced.

There's a job for Hartzell cool blast or utility fans in almost every plant. Man cooling. Materials cooling and drying. You probably know right now of a dozen spots where one of these fans could be used to help keep things running more smoothly. So don't wait. Drop us a line today or call your nearby Hartzell field engineer. You'll get action. Fast.

The installations shown in these photos were handled by the Hartzell field offices at Houston, Texas (phone KE-4565); and Fairfield, Connecticut (phone CL-9-3349).

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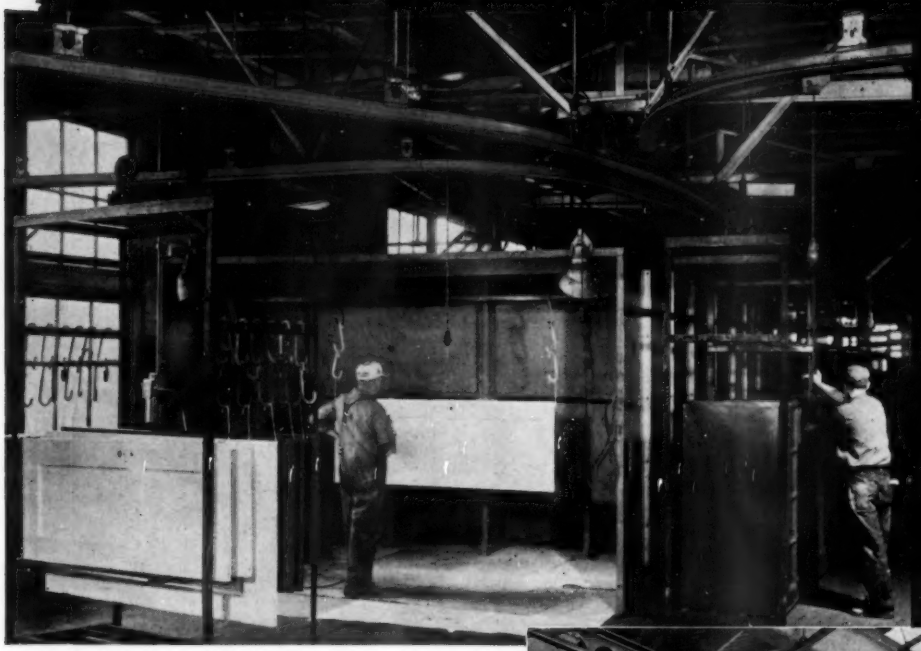
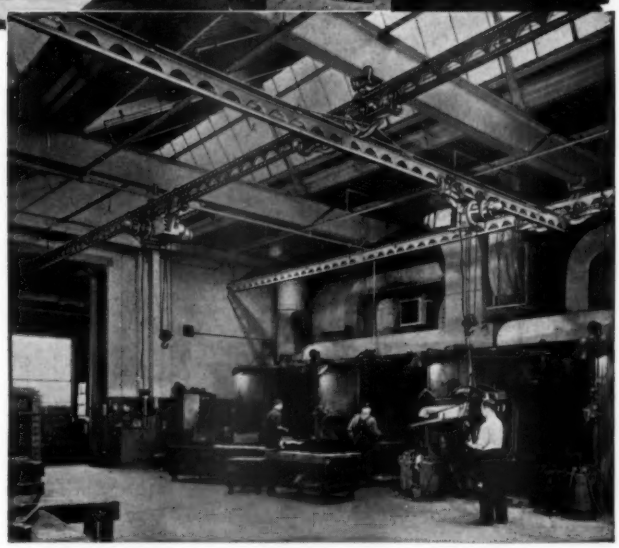


This rack carrier system speeds the painting of metal doors and filing cabinets. The items are conveyed to and from the spray booth in an even flow without log-jamming.

A three-runway crane simplifies handling of ironing machines and other laundry equipment in this paint room. The middle runway track extends to other parts of the building, enabling loads to be brought directly to the room by the hoist carrier seen at left.



PAINTING and handling parts or complete machines is greatly simplified and speeded by use of an inexpensive Cleveland Tramrail overhead system.

Items may be delivered from fabrication department, painted by spray or dip, and conveyed to assembly or shipping without leaving the tramrail system. Freshly painted pieces are easily moved the overhead way with little danger of being touched or damaged.

Various types of Cleveland Tramrail equipment are available to suit different conditions. Whether it be cranes, rack carrier systems or completely automatic installations, Cleveland Tramrail engineers can advise and serve you.

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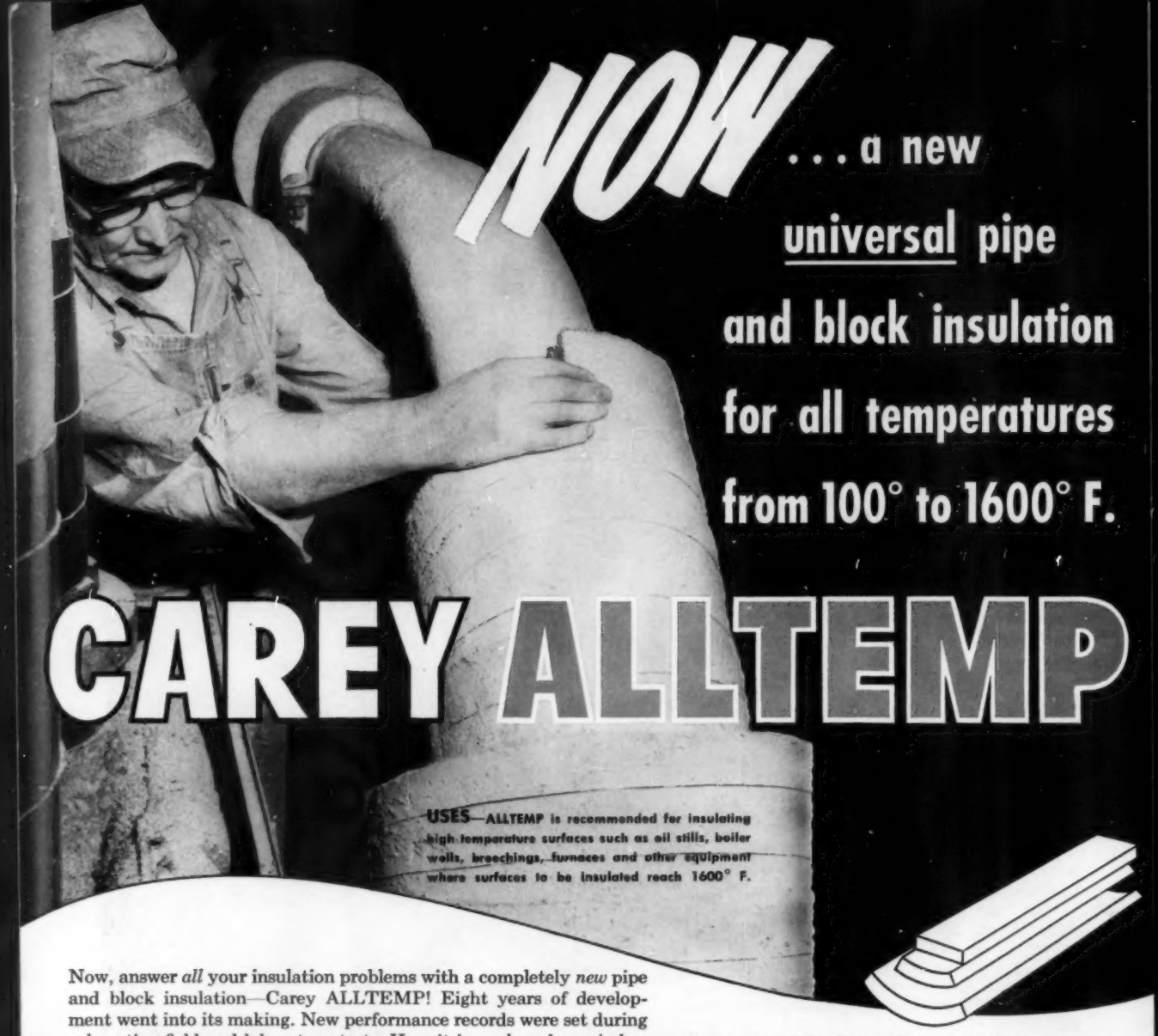

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	200	400	600	800	1000	1200
	Nominal Thickness, Inches					
1½ & Under	1	1	1½	2	2½	3
2	1	1½	2	2½	2½	3
2½	1	1½	2	2½	3	3½
3	1	1½	2	3	3	3½
3½	1	1½	2	3	3½	3½
4	1	1½	2½	3	3½	4
4½	1½	2	2½	3	3½	4
5	1½	2	2½	3	3½	4
6	1½	2	2½	3½	4	4½
7	1½	2	2½	3½	4	4½
8	1½	2	3	3½	4	4½
9	1½	2	3	3½	4½	5
10	1½	2½	3	4	4½	5
11	1½	2½	3	4	4½	5
12	1½	2½	3	4	4½	5
14 & Over	1½	2½	3½	4	4½	5½

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AUGUST, 1955

Plant Engineering

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